American Foundryman

JANUARY
1955

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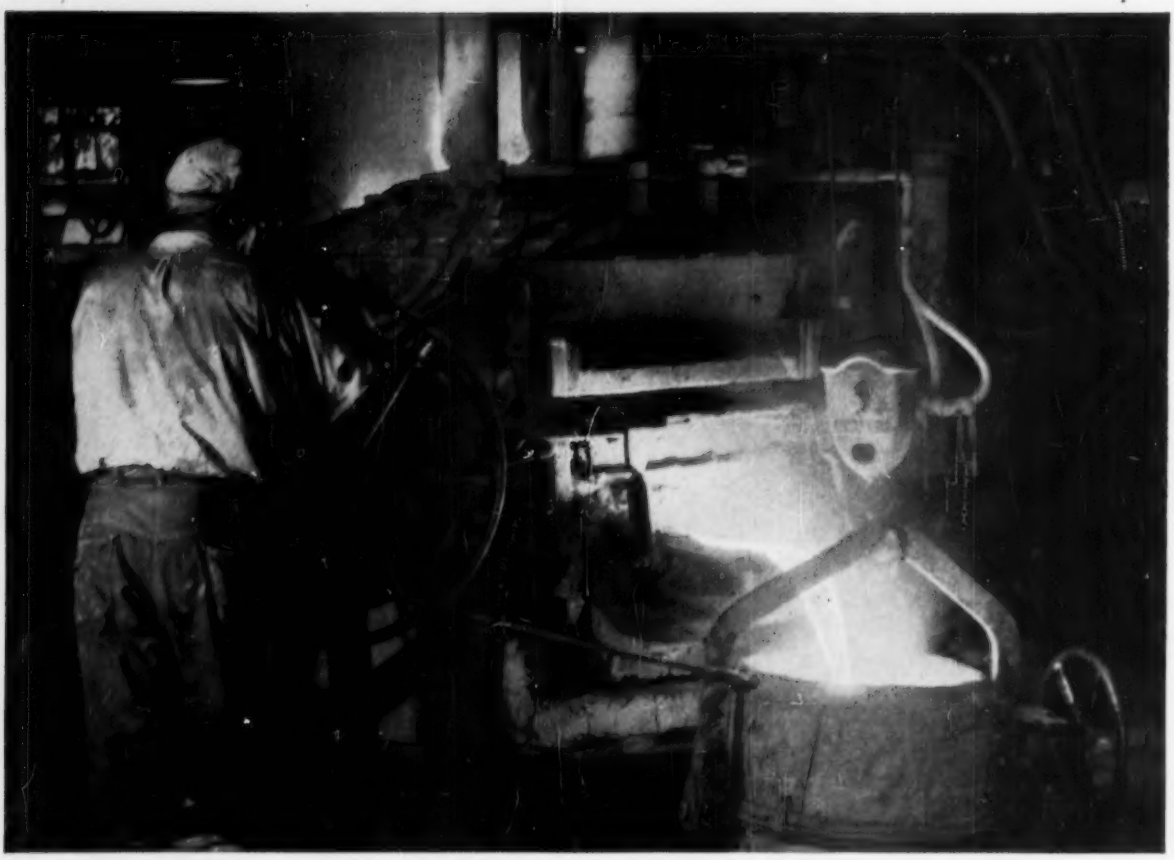

Strong, sound irons for special castings are produced in this Lectromelt Furnace at Ferro Machine & Foundry Company, Cleveland.

It's easy to produce special alloy iron castings and profit too . . . with a Lectromelt*

There's a size Lectromelt Furnace for your foundry

"With our electric-furnace duplexing process, we are able to produce special irons for a great variety of castings requiring heat and wear resistance and ability to withstand extreme pressure . . . and do it economically."

In the duplexing process at Ferro Machine & Foundry Company, molten iron from the cupola is poured into the Lectromelt Furnace. There, elements are added or removed to give the exact composition specified and the charge is superheated electrically to achieve a fine-grain structure. Thus, special irons are produced as regular routine.

Lectromelt Furnaces range in capacities from 25 pounds to 150 tons, meeting every development and production requirement. They permit the most exact control of temperature and analysis. They're on melting, refining, smelting and reduction work. For Bulletin No. 9, telling you more about them, write Pittsburgh Lectromelt Furnace Corp., 316 32nd Street, Pittsburgh 30, Pa.

Manufactured in . . . ENGLAND: Birlec, Ltd., Birmingham . . . FRANCE: Stein et Roubaix, Paris . . . BELGIUM: S. A. Belge Stein et Roubaix, Bressoux-Liege . . . SPAIN: General Electrica Espanola, Bilbao . . . ITALY: Forni Stein, Genoa. JAPAN: Daido Steel Co., Ltd., Nagoya

*REG. T. M. U. S. PAT. OFF.

MOORE RAPID

WHEN YOU MELT... Lectromelt

For more data, circle No. 864 on postage-free Reader Service card on p. 17 or 18

EASY SAND CONTROL

You take Federal's CROWN HILL Seacoal, GREEN BOND Bentonite and Federal SAND STABILIZER and you've got yourself three sand additives that will really simplify your sand control and provide uniform, thoroughly satisfactory results.

These three materials, added in varying amounts to your sand, dry or in slurry form, will give you close control over carbon content, green and dry strength, and will also provide GREATER FLOWABILITY, with LESS LUMPY SHAKEOUT.

CROWN HILL Seacoal is exceptionally low in sulphur content—which means your castings will have more easily-machined surfaces. GREEN BOND Bentonite is unexcelled in its ability to develop and control green and dry strength. It lasts and lasts—retaining its bonding efficiency much longer than any other clay. Its medium to low viscosity characteristics enable you to cut down on mulling time—permits slurry users to add more bentonite per gallon of slurry, for just the strength desired, without strain on the pumping system. Federal SAND STABILIZER improves resistance to expansion defects and increases flowability—thus increasing uniformity of mold hardness. It sharply reduces viscosity of slurry, without decreasing bond strength per gallon of slurry. And it provides better, LESS LUMPY SHAKEOUT without adding other clays to sand mixtures.

Yes, these Federal additives really simplify your sand control and give you excellent results. But, that's not all! *Their cost will not exceed $1.00 per ton of castings produced!* To learn more about these efficient additives, write for your copy of our bulletin on "Tailor-Made Molding Sands".

IMPORTANT
FOR SLURRY USERS!

The addition of Federal SAND STABILIZER to your slurry will definitely reduce its viscosity and increase its green strength. This enables you to add a greater percentage of Granulated GREEN BOND Bentonite* to your slurry—producing a more highly concentrated strength per gallon of slurry (lower water content)—with *less strain* on the pumping system and *no clogging* of pipe lines.

*Federal GREEN BOND Bentonite is available in three convenient forms:

(1) PULVERIZED—for general foundry use as a dry additive, for core or molding sand.

(2) GB-100 FINE GRANULAR—a dry additive with low dust content, for core or molding sand.

(3) NO. 1200 SLURRY GRADE GRANULAR—for use as a wet additive.

All three grades have medium to low viscosity properties.

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If you have "lumpy shakeout" — use Federal SAND STABILIZER!

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POURING-OFF

Combined conveyor-escalator pouring at New Idea, Coldwater, Ohio (Div. Avco Manufacturing Corp.) Photo courtesy of Bartlett Snow. Modern crane, portable weigh hopper and skip chargers also in use here.

Rigid, straight-line control from monorail to ladle spout insures quick, accurate spotting over sprue holes.

Faster • • • Safely • • • Profitably • • •

Much mechanical handling of hot metal does flow through basic, routine channels between cupola spouts and sprue holes. BUT, every pouring floor presents problems that are DIFFERENT! These DIFFERENCES may arise from variations in cupola-spout and monorail heights. DIFFERING, too, are heights of molds and pouring platforms. Speed ratios, between conveyor and escalator in the pouring system shown here, require the closest timing.

Prescribing for and designing to meet all these and related DIFFERENCES is specialized business which should be entrusted only with foundry equipment specialists. KNOWING HOW to engineer the over-all system into a smooth RECEIVING . . . DISTRIBUTING and POURING line is a result of MODERN'S thirty-five year's experience. It's a tested, profit-boosting service that's FREE to foundry executives who outline their problems on their own company letterheads. For information only you can use the coupon . . .

A MODERN, steel-shell, covered ladle may be equipped with a graphite liner.

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MODERN REPRESENTATIVES IN ALL PARTS OF THE WORLD

American Foundryman

Volume 27 *January 1955* *Number 1*

Published by American Foundrymen's Society

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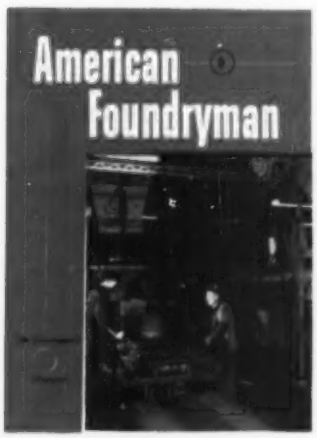

One of Hunt-Spiller's (Boston) new jolt-rollovers installed as part of $300,000 modernization program. Also installed: direct arc electric furnace, sand handling and storage facilities, automatic shot blast and cement floors in the cleaning room, and core blowers.

A STRAIGHT LINE

is the shortest route between two points

Raw Material Stage — **Management Planning Time** — **Finished Product Delivery**

. . . and the most logical reason why this new American Foundrymen's Society publication —TIME AND MOTION STUDY FOR THE FOUNDRY— is such a vital help to foundry management.

Actually, this book is a symposium of carefully selected articles that provide practical foundrymen with the "shortest route" to . . .

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- **REDUCTION IN COSTS**
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TIME AND MOTION STUDY FOR THE FOUNDRY is a casebound, 8½ x 11-inch book, totaling over 165 pages. It is a collection of material that is invaluable as a guide to small managements seeking guide posts for a standards department . . . to standards departments seeking to compare and evaluate their efforts with a correlation of workable procedure and proven experience . . . to management, for widening their horizons of accomplishment through motion and time study performance.

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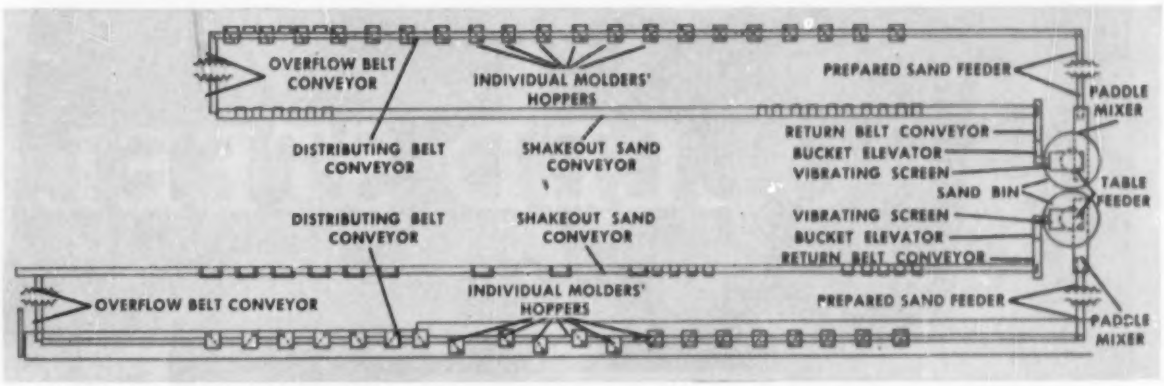
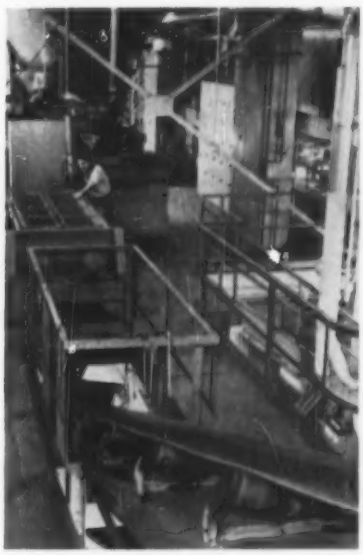
Now 3 Crouse-Hinds foundries are LINK-BELT mechanized



▲ At squeeze molding side of Crouse-Hinds' Syracuse aluminum foundry, sand travels on Link-Belt distributing belt conveyor over molders' hoppers. Overflow sand is carried on Link-Belt cross belt conveyor in background to shakeout belt conveyor, which is also fed by hoppers at foot ends of roller conveyors.



Link-Belt equipment on sand preparation floor includes storage tank, revolving plate feeder, double paddle mixer and inclined belt conveyor delivering to distributing belt conveyor. Operation involves two similar systems, each feeding 20 molders' hoppers at a capacity of 35 tph of prepared sand.

New Syracuse aluminum foundry gets modern sand handling system

LINK-BELT mechanization reduces unit costs . . . speeds production . . . betters working conditions. And Crouse-Hinds has proved it — *three times since 1928*. The most recent installation — in their Syracuse aluminum foundry — provides low-cost sand handling. Sand is moved mechanically through preparation, molding, shakeout and reconditioning.

If your castings output is limited by an outdated handling system, Link-Belt mechanization is the answer. Your foundry may be large or small — gray iron, steel, malleable or non-ferrous. Whatever your requirements, Link-Belt equipment and proved engineering practices can cut your operating costs . . . conserve manpower for more exacting jobs. Our foundry specialists will pool their experience and judgment with yours and your consultants' to provide smooth coordination between operations . . . boost production in present floor space. And it all begins with a call to your nearby Link-Belt office.

11 054

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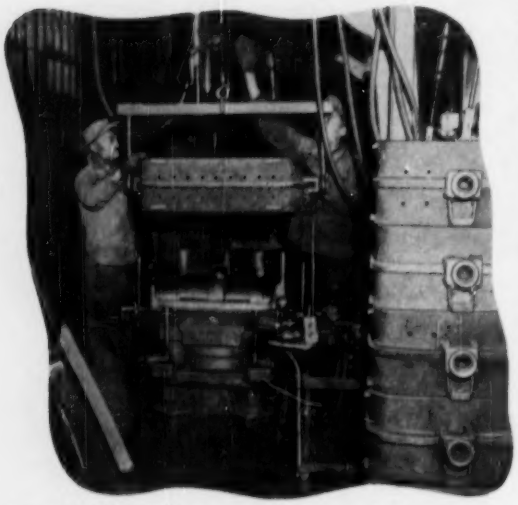
Not Pressed Steel

...and that's why they stand the gaff of tough foundry use



Sterling Rolled Steel Flasks in use at a well-managed Mid-West foundry.

Tensile strength of 70,000 p.s.i. adds *years* to the life of Sterling Foundry Flasks. Special hot-rolled steel channel with controlled content of copper bearing and carbon assures maximum strength. Sterling Flasks are all-steel welded into one solid, rigid piece... with center-rib rolled into each section to fortify against torsional and other strains. Square cornered sand-flanges, full width bearings, partings accurately *machined* to .005" precision . . . these and other life-prolonging features help you make better castings, at better profit, with Sterling Rolled Steel Flasks.

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Even top-speed molding leaves no soft spot under the patented Sterling Sand-flange. Fillets eliminate sharp corners at top and bottom of both cope and drag. Flange won't curl under jolt action. Investigate light weight and super strength of Sterling Rolled Steel Foundry Flasks.

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For more data, circle No. 869 on postage-free Reader Service card on p. 17 or 18

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Zirconium . . 12 to 15% and 35 to 40% Zirconium Alloys, and Nickel-Zirconium.

"EM" Briquets . . Silicon, Silicomanganese, Ferromanganese, Chromium, and Zirconium Briquets.

Information about these and other alloys and metals produced by ELECTROMET is contained in our new catalog "ELECTROMET Ferro-Alloys and Metals." Write for a copy.

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For more data, circle No. 850 on postage-free Reader Service card on p. 17 or 18

From 18 inches to a Feather-edge in Section

...or how Chuck Wright uses a 16-ton casting to bust bubbles

"Do you know why a big ship uses as many as 6 propellers during its life at sea?" asked Chuck Wright, INCO distributor foundry specialist.

"Blame the water," said Chuck. "Salt water, especially, eats away at the usual bronze in a large propeller. And bursting bubbles take a toll, too, when blades churn the water. Engineers call it *cavitation.*

"Propeller makers have known for years that nickel-aluminum bronze resists cavitation . . . four to six times better than manganese bronze. But nobody could tell you why the nickel alloy had never been tried in a big ship's wheel.

"When a sizeable propeller was first suggested by INCO, a barrage of questions greeted the proposal. How would you control large grain growth in the heavy hub? Could it be done by deep chilling? And what would risering practice be?

"Some foundrymen thought the gating and risering might be too difficult. Others said greatly differing section sizes would cause such different physicals, they couldn't be tolerated in one casting. The cost of pioneering was also mentioned.

"Baldwin-Lima-Hamilton, however . . . figuring the advantages to be gained far outweighed the risk involved . . . got an order from the U. S. Lines and made a 5-bladed 13 ton wheel of Nialite, their trade named nickel-aluminum bronze alloy. And listen to the results . . .

"The 4-bladed standard manganese bronze wheel it replaced on the S. S. American Clipper weighed 15½ tons. The new one is lighter by about 20%. It has thinner and therefore more efficient blades, thanks to its high corrosion-fatigue limit in salt water. And it puts less loading stresses on tailshaft. But here's the big pay-off . . .

"After twenty months' transatlantic service, the finish-grinding 'swirl marks' . . . which quickly disappear from the usual bronze wheel . . . were still clearly visible on this casting. While drydocked for inspection, you could actually see the superiority of this nickel alloy's resistance to cavitation, erosion and corrosion.

"So when anybody says 'it can't be done,' the Nialite wheel cast by those foundrymen near Philadelphia comes in handy for 'busting' bubbles.

"Even if you don't make 20-foot propellers . . . whenever your problem takes in the metallurgy of castings, I'll be glad to give you some practical help. Just drop me a line."

INCO TRADE MARK

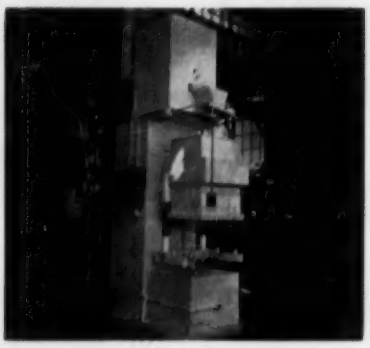
Chuck Wright

The International Nickel Company, Inc.

67 Wall Street New York 5, N. Y.

Products & Processes

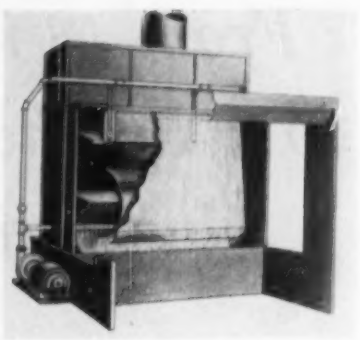
Fill out postcards on pages 17-18 for complete information on items listed on pages 10-12-17-18-20



▼ Vibration Indicators

New low speed model has been added to the Vibra-Tak line of tachometers and vibration indicators. It may be used for finding the speed of oscillation on vibrating screens, conveyors, separators, crushers, grizzlies, tampers, vibrators, large engines and other industrial equipment. It has a range from 200 to 2000 cycles per minute and extends the range now covered by the high speed model which is designed for speeds from 2000 to 15000 cpm. Leather case is included. *Martin Engineering Co.*

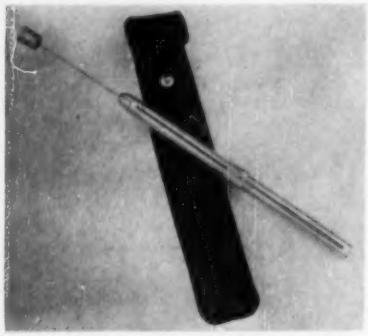
For more facts, circle No. 797 on p. 17



▲ Shell Investment Unit

Fully automatic complete-in-itself shell investment unit has been introduced to offer shell molders all of the control features necessary for exacting production of shells up to 24 x 30 in. It forms up to six perfect shells each minute, though actual production from the unit will depend upon the shell curing capacity provided. The shell investor features precise investment time control, metered sand resin addition, controlled sand resin rainfall, and thorough lump scavenging. *Beardsley & Piper.*

For more facts, circle No. 795 on p. 17



▲ Paint Spray Booth

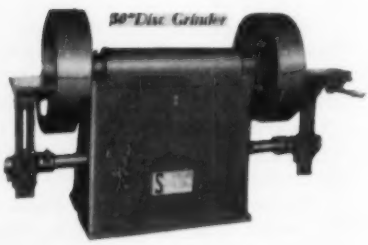
Water spray paint booth that is claimed to be practically 100 per cent efficient in removing paint particles from the exhaust air, has been announced. Using an entirely new type baffle chamber, the Cleanaire Water Wash Paint Spray Booth provides a positive air cleaning action that prevents paint pigments and volatiles from reaching the exhaust stack or the outside of a building. Air scrubbing chamber features a specially-designed spray header mounted within two curved baffle plates. *Despatch Oven, Co.*

For more facts, circle No. 799 on p. 17

▼ Car Puller

New, low-cost, capstan type car puller incorporates several features in its design. Simplified construction allows trouble free operation with a minimum of maintenance. Anti-friction bearings are used throughout. Dripproof housing encloses all gearing. Gears run in oil bath. Weatherproof. Compact for installation between tracks or for working in congested areas. Capstan head of proper size gives long rope life yet provide effective snubbing on rope with little effort on the operator's part. *Clyde Iron Works.*

For more facts, circle No. 798 on p. 17



▲ Disc Grinders

A line of heavy duty double end disc grinders has been redesigned. The 30 in. model pedestal has an integral large size rocker arm bar with an 8½ x 14 in. plain swivel table at the left and an 8 x 14 in. lever feed table at the right. Adjustable stop collars on the rocker arm bar allows for either locking the tables in a fixed position or to limit the oscillating motion for operator's comfort. The entire spindle assembly is perfectly balanced. Guards have permanent exhaust outlets. *Standard Electrical Tool Co.*

For more facts, circle No. 800 on p. 17

continued on page 12

▲ Dust Collection

A new mechanical dust collector, called the Paraclone, has been developed. Unit differs from conventional systems embodying a large number of small cyclones in parallel by having a secondary circuit which keeps the discharge from the small cyclones under constant negative pressure. This prevents recycling of dust in the primary system. Units are cast from a highly abrasion-resistant gray iron, and are secured to the housing by a single bolt and nut, making for fast installation. *Aerodyne Development Corp.*

For more facts, circle No. 796 on p. 17

The Case for *Famous* CORNELL CUPOLA FLUX

BRASS FLUX

Cornell Brass Flux makes metal pure and clean. It plays an important role in the production of high grade, bright finish aluminum or brass castings. Use more scrap without danger of dirt, porous or spongy spots. Thinner, yet stronger sections can be poured and the Cornell exclusive formula prevents obnoxious gases.

Write for Bulletin No. 46-A.

ALUMINUM FLUX

Famous Cornell Aluminum Flux cleans molten aluminum for tough, clean castings even when the dirtiest scrap is used. Forms a perfect covering over the metal during the melting process preventing oxidation and the gases that form during the melting.

Write for Bulletin No. 46-A.

GRAY IRON FLUX

For Gray Iron Foundries and Malleable Foundries with Cupolas. Famous Cornell Cupola Flux produces a cleaner metal with greater fluidity. You get superior castings with better machinability, tensile strength, uniformity of hardness and more uniform graphite distribution from light to heavy sections.

This flux increases efficiency in cupola operation giving you cleaner drops with bridging over practically eliminated! Cupola linings need less patching because of protective glazed or vitrified surface which is formed on brick or stone. Hundreds of foundries now use Cornell Flux. If you are *not* one of them it will pay big dividends to investigate now!

Write for Bulletin No. 46-B.

The **CLEVELAND FLUX** *Company*

1026-40 MAIN AVENUE, N. W. • CLEVELAND 13, OHIO

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Products & Processes

continued from page 10

Fill out postcards on pages 17-18 for complete information on items listed on pages 10-12-17-18-20

▼ Refractory Gun

New BRI Gun, Model A-20, has recently been introduced. Designed specifically for air-emplacement of granular basic refractories, gun offers a quick, economical method of repairing linings in electric and open hearth steelmaking furnaces, soaking pits, heating furnaces and cupolas. Greater simplicity, more rugged construction, and an enlarged 20 cf hopper capacity are the outstanding features of the new gun. An operating platform is also included on the new gun. *Basic Refractories, Inc.*

For more facts, circle No. 803 on p. 17

▲ Automatic Injection Press

The 3C Industrial Injector Model B is claimed to be the first completely automatic injection press designed for large volume production of accurate wax or plastic patterns for industrial investment casting. Once the operator has positioned the mold over the injection nozzle on the work surface, he flips the main switch on the control panel and mold is clamped, material injected and clamp released in one continuous operation. Fully illustrated brochure is available. *Centrifugal Casting Supply Co.*

For more facts, circle No. 801 on p. 17

▲ Photo Close-Up Attachment

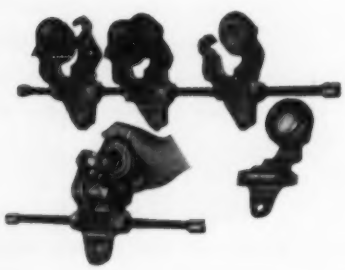
A newly developed technical close-up attachment, particularly suited to solving color photographic problems in industrial and scientific laboratories, has been announced. Attachment is offered in two basic kits. The Kodak Pony Close-Up Kit includes the framing attachment, supplementary lens and filters and special Close-Up Flashguard. The Kodak Technical Close-Up Outfit, includes the kit, Kodak Pony 828 Camera, flashholder, and attachments all in one ready-to-use package. *Eastman Kodak Co.*

For more facts, circle No. 805 on p. 17

▼ Granular Dust Collector

An outside-in twist that reverses the normal tangential flow of most centrifugal dust collectors is credited with giving the new AMERclone dry granular dust collector high efficiency over a wide range of air volumes. Heart of the development is a conical inlet which imparts a swirling motion to dust particles, while permitting clean air to travel through the Type G AMERclone tube without changing direction. Each tube has an approach velocity of 1000 fpm. *American Air Filter Co.*

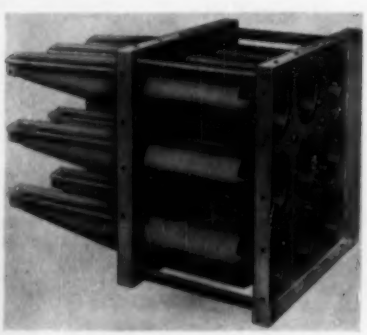
For more facts, circle No. 804 on p. 17



▲ All Weather Cabs

Development of an all weather cab for Models FTP60-24 (gasoline powered) and FTP60-24 (Diesel powered) pneumatic tired, 6000 lb capacity, fork lift trucks has been announced by the Buda Co. Features include: full driver visibility; safety glass installed throughout; adjustable door windows for better ventilation; entry from either side of cab; positive action electric windshield wipers, and tinted plexiglass overhead window. Heater and defrosters are optional equipment. *Buda Co.*

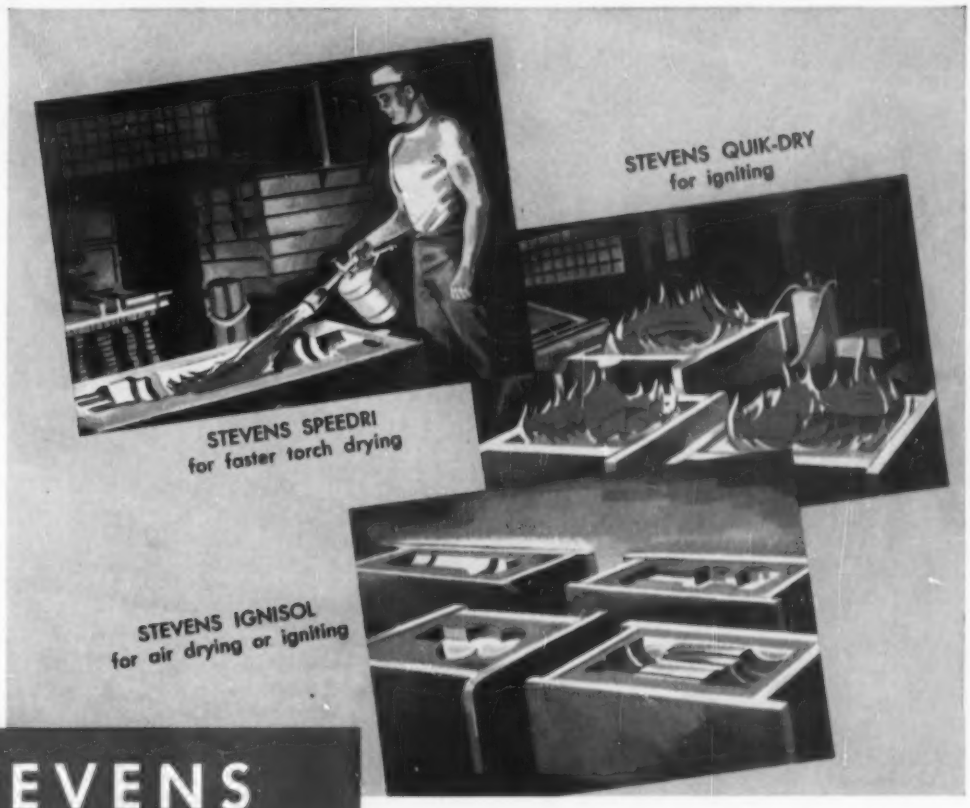
For more facts, circle No. 802 on p. 17



▲ Conveyor Trolley Bracket

Recently introduced was a newly designed bracket; a component of the trolley assembly used on American Cable-Link overhead conveyor systems. The new patented bracked incorporates a removable wheel feature. This, it is pointed out, permits wheel changes without dismantling or removing trolley from the monorail in American Cable-Link systems. The feature of this bracket to makc wheel changes on conveyor trolleys only a matter of seconds is the hook design. *American Cable-Link Co.*

For more facts, circle No. 806 on p. 17



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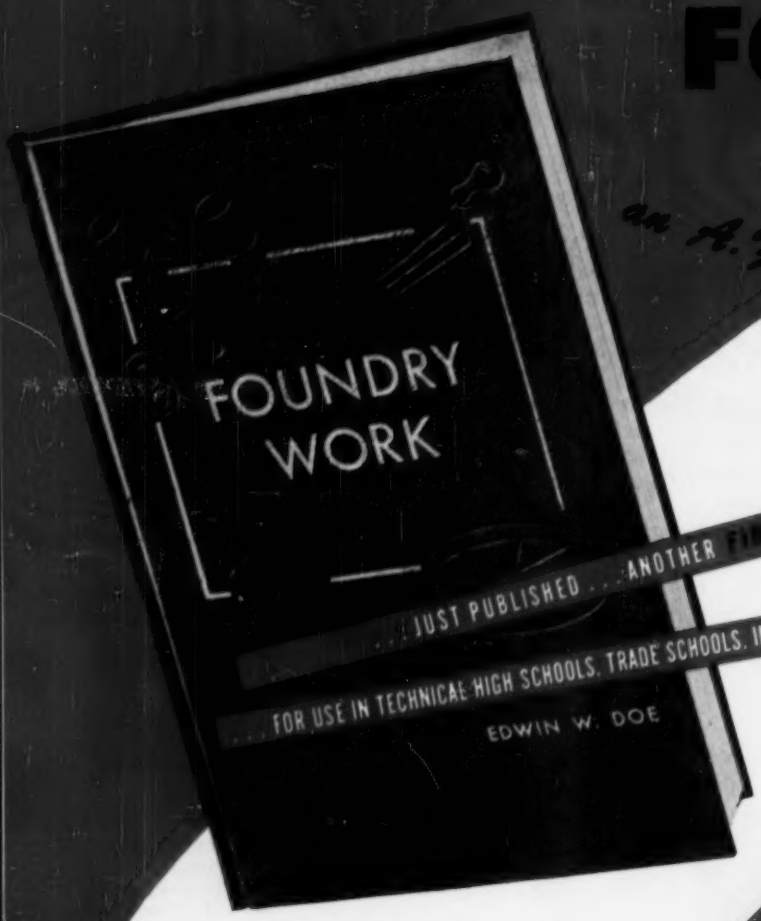

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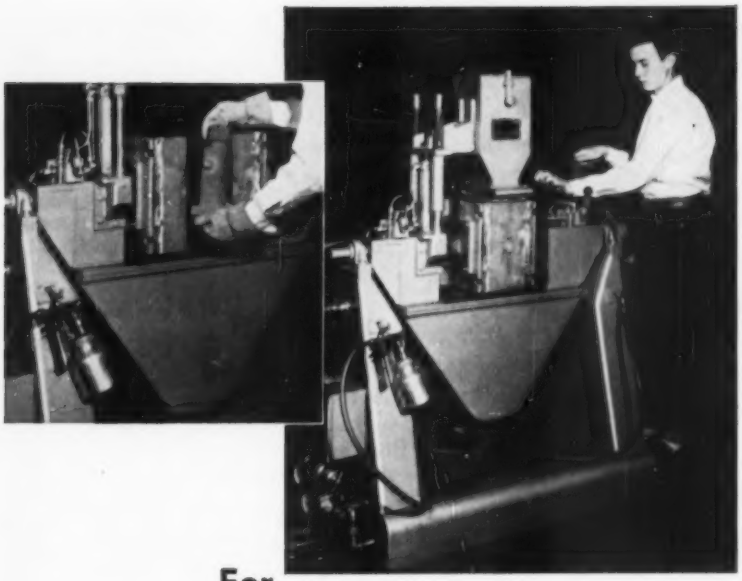

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OVERLOADS AND HIGH TEMPERATURES are death to organic insulated motors. Take, for example, the 5 hp Class A drive motor on a hot ingot conveyor in another eastern foundry. Operating on a 20 second start and stop cycle, the motor hardly gets up to speed before it is shut down. This, plus extremely high ambient temperatures caused the motor to burn out about every six weeks.

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When you produce shell-molds with FOUNDREZ 7500, curing is *faster*. This remarkable RCI resin takes extremely high oven temperatures, enabling you to turn out more molds per hour . . . molds of uniform superiority. They're structurally stronger, better able to vent gas, freer from distortion.

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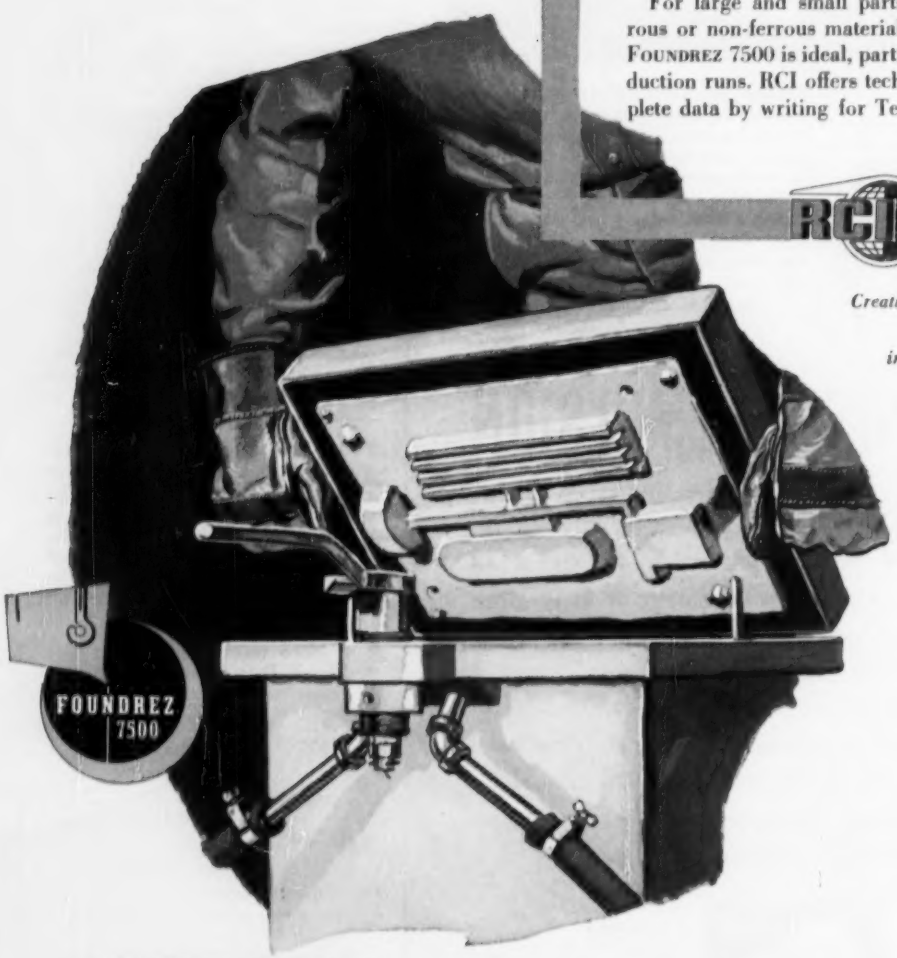

The foundryman unclamps the pattern plate from the dump box. Notice the thin shell of partially-cured FOUNDREZ 7500 and sand clinging to the plate.

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Products & Processes

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Shell Release Agent

Shallway Shell Curing Oil, SC-10, and Shallway Shell Release Emulsion, SR-20, have been introduced as a new shell molding release agent recently. SC-10 is used for curing or breaking in patterns and SR-20 is for routine, continuous use in releasing shells. *Shallway Corp.*

For more facts, circle No. 807 on card

Two-Wire Thermocouple

New two-wire thermocouple, encased in stainless steel tubing, has been announced. Lengths of the thermocouple range from six to 60 in. Fiberglass insulation in the new model thermocouple permits greater application flexibilty. *Minneapolis-Honeywell Regulator Co.*

For more facts, circle No. 813 on card

Electroplating Process

Stevco Bright Zinc Process is the latest electroplating process added to the Stevco line. New process produces a bright zinc plate over a wide range of current densities such as are found in barrel plating. Technical Bulletin P-130 gives further data. *Frederic B. Stevens.*

For more facts, circle No. 808 on card

Porosity Detector

The R. P. Porosity Detector, Model 1-A, is claimed a rapid and inexpensive tester for positively eliminating the molten metals as a source for porosity or gas in aluminum castings. Foreman can conduct the test, prior to pouring, in one minute. *Botsford Chemical Co.*

For more facts, circle No. 814 on card

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Visual Signal System

New model Bin-Dicator Bin Level Indicator incorporating a built-in bull's-eye signal light for use in installations requiring a signal which can be readily seen by an operator, has been announced. A toggle switch is provided so signal light may be shut off. *Bin-Dicator Co.*

For more facts, circle No. 809 on card

Hardness Tester

Three colored lights, which signal the relative Brinell hardness of the test piece, make all the decisions of acceptability or rejection on the new Color-Glance Brinell Hardness Testing Machine. Yellow indicates too hard; green, within range, and red, too soft. *Steel City Testing Machines.*

For more facts, circle No. 810 on card

Arc-Melting Furnace

New inert-atmosphere, arc-melting furnace—designed to melt highly reactive or refractory metals—has been announced. New furnace, a cold mold type, can be used for limited production and is recommended for industrial research laboratories. *General Electric Co.*

For more facts, circle No. 811 on card

Photoelectric Pyrometer

A Photoswitch Photoelectric Pyrometer for industrial use which makes possible the precise monitoring and control of the temperature of hot materials, has been announced. Control operates from the amount of infra-red radiation emitted by the hot object. *Photoswitch Division.*

For more facts, circle No. 812 on card

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Free Foundry Information

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Shell Molding Resins

Booklet, "Phenolic Resins for the Shell Molding Process," deals with the development of shell molding, patent situation, description of the process, sequence of operations (illustrated) and lists the advantages. *Barret Div., Allied Chemical & Dye Corp.*

For more facts, circle No. 815 on card

Industrial Truck Rules

Do's and don'ts of safe operation of industrial trucks are detailed in new literature now available. In total, 31 rules for effective, safe operation of trucks are pictured and/or discussed. Operator training suggestions are also included. *Elwell-Parker Electric Co.*

For more facts, circle No. 817 on card

Brazing Manual

New "how-to-do-it" book contains data for brazing shapes, sheet, castings, tubing and assemblies of copper, brass, steel, aluminum and cast iron. Plain words and diagrams clear up and simplify a number of points. *All-State Welding Alloys Co., Inc.*

For more facts, circle No. 819 on card

Revised Instruction Sheet

Revised Tempilstik® instruction sheet is now available. New version critically examines factors which affect temperature indication by means of Tempilstiks®. How to determine temperatures in a number of special cases are also described. *Tempil® Corp.*

For more facts, circle No. 816 on card

Dust Control

Bulletin No. 995 shows how wood dust can be profitably controlled in the production of patterns, furniture, shipping crates, pallets and a host of other products where sawing, planing, drilling, sanding, etc. are done. *American Wheelabrator & Equipment Corp.*

For more facts, circle No. 818 on card

Centerless Grinding Wheels

Bulletin No. 6925 describes Manhattan Rubber-Bonded Centerless Grinding Wheels. Information on Manhattan Regulating or Feed Wheels is included and a page is devoted to a simplified price list. Manhattan Rubber Div., *Raybestos-Manhattan, Inc.*

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Fork Lift Trucks

Bulletin No. 5013 describes and pictures the new G-52 series of gasoline fork lift trucks. Includes information on fluid coupling which has been built into the fly wheel as an integral part of the unit to reduce overhang and over-all length. *Yale & Towne Manufacturing Co.*

For more facts, circle No. 821 on card

Bonding Agent

Pamphlet lists typical chemical analysis of Yellowstone Western Bentonite. Illustrations show mining process and booklet also lists comparative tests made. Processing at the plant, following the mining, is also described. *Magnet Cove Barium Corp.*

For more facts, circle No. 822 on card

Core Mudding Compound

Booklet points out how Dob-It, a ready-mixed core mudding compound, will fill the joint of a pasted core with amazing ease. Claims material will not dry out in storage; has low gas evolution, and contains no silica or other abrasive. *Whitehead Brothers Co.*

For more facts, circle No. 823 on card

Cupola Emission Problems

Copies of the paper, The Cupola Emission Problem and Its Solution, presented by Aubrey J. Grindle to the Semi-Annual Meeting, East Central Section, Air Pollution Control Association at Harrisburg, Pa., are now available. Illustrations are also included. *Grindle Corp.*

For more facts, circle No. 824 on card

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DELTA PERMI-BOND is a revolutionary development which eliminates the use of SEA COAL . . . and its inherent disadvantages . . . in molding sands.

It is a specially prepared pure hydrocarbon, completely volatile at elevated temperatures. It decomposes to form a vapor-gas cushion, which is reducing in nature, and leaves only a trace (two-tenths of 1% maximum) of ash.

NOTE THESE IMPORTANT ADVANTAGES . . . 1. Always uniform. 2. Eliminates sand contamination. 3. Greatly reduces gas, smoke, soot and dirt in the foundry. 4. Provides correct amount of vapor gas in the mold cavity to prevent casting blows. Allows use of lower permeability sand. 5. Increases dry strength of sand 75% to 90%. 6. Prevents scabbing, buckling, rat-tailing and cutting which greatly reduces scrap castings. 7. Improves casting finish, cuts cleaning room costs to a minimum. 8. More economical to use; reduces your sand costs. 9. Much cleaner and more foolproof to use than sea coal.

DELTA DRI-BOND
IN CORE SAND

DELTA DRI-BOND BINDER is a product of several years of research and experimentation in our own sand research laboratory and proved by additional years of actual experience-in-use data compiled by prominent foundries. The excellent results obtained with Delta Dri-Bond Binder, reported by all sources, establish beyond question both the outstanding superiority and greater economy of this new product for use in steel, gray iron and non-ferrous foundries.

In recent tests, conducted by impartial personnel, it was definitely proved that Delta Dri-Bond Binder has (a) — higher tensile and compression strength, (b) — much greater waterproofing properties and (c) — considerably higher green strength and hot strength than other dry binders tested.

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FOR CORE AND MOLDING SANDS

DELTA SAND CONDITIONING OIL is a very fluid organic liquid with a light greenish color cast. It has a very low surface tension and acts as a lubricant in sand mixes. It improves the flowability and workability of both molding and core sand mixes. Its greatest use is in core sand mixes where, in addition to improving the flowability of the sand, it helps eliminate sand sticking to the core boxes.

It has proven exceptionally useful in the elimination of core sand sticking problems in plastic resin core sand mixes.

DELTA

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MILWAUKEE 9, WISCONSIN

Free Foundry Information

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Camera Microscope

Bulletin discusses Unitron Universal Camera Microscope and Metallograph. Outlines features, optical design and specifications. Well illustrated booklet describes objective lenses, visual eyepieces and other units. *United Scientific Co.*

For more facts, circle No. 825 on p. 18

Tractor Shovel Attachments

"Useful Attachments for Payloader Tractor Shovels" is the name of a new piece of literature now available. Included are 16 attachments that are available to adapt these tractor-shovels to many tasks in addition to bulk materials handling and earth-moving. *Frank G. Hough Co.*

For more facts, circle No. 831 on p. 18

Good Gating

News Letter No. 16, "Good Gating Helps," includes photographs illustrating what can be accomplished by correct gating. Describes how a gray iron casting was made in the drag and how the runner offered a perfect trap. *American Colloid Co.*

For more facts, circle No. 836 on p. 18

Cast Monel Described

Technical booklet, "Engineering Properties of Cast Monel," points out that Cast Monel combines high strength with good ductility and corrosion resistance. It is a nickel-copper alloy containing about two-thirds nickel. Tensile strength comparable to carbon steel. *International Nickel Co.*

For more facts, circle No. 826 on p. 18

Air Traps

Bulletin No. 2022 describes the methods of selecting and installing Armstrong Air Traps for automatic drainage of water from compressed air intercoolers, after-coolers, receivers, separators and drip points. Also includes detail drawings. *Armstrong Machine Works.*

For more facts, circle No. 832 on p. 18

Aluminum Alloys

New 24-page booklet contains data on aluminum alloys, forms, properties, applications and availability. Condensed tables and charts provide convenient reference material. Sand casting and permanent mold charts are included. *Kaiser Aluminum & Chemical Sales, Inc.*

For more facts, circle No. 837 on p. 18

Tin-Bronze Porosity

Technical Service No. 32 describes the Gross Porosity in Tin-Bronze Casting. Outlines the investigation required; general examination; examination under the microscope, chemical analysis, and the conclusions that were found. *Foundry Services, Ltd.*

For more facts, circle No. 827 on p. 18

FREE TEAR SHEETS

of all AMERICAN FOUNDRYMAN articles are available on request. Keep your magazine intact and pass it on for others to use. For free tear sheets, write to Editor, AMERICAN FOUNDRYMAN, Golf & Wolf Roads, Des Plaines, Ill. Please show company connection and your title on tear sheet request.

Fork Truck Booklet

New, illustrated, 28 page treatise, "Why the Small Fork Truck?," by Nathanial Warshaw, is now available. Shows how small and medium sized plants can compete with the big business in materials handling efficiency. Book is written as a training aid. *Market Forge Co.*

For more facts, circle No. 838 on p. 18

Bead-Type Sealer

Booklet gives a report on Kopeseal, a new permanently soft sealer. Illustrations show actual applications and many of the advantages are listed. It is a heavy mastic compound, extruded and furnished in bead or rope-like form. *Presstite Engineering Co.*

For more facts, circle No. 828 on p. 18

Refractory Material

Bulletin No. A-23-54 covers Fracto-Crete No. 62, a castable refractory; Super Fracto-Crete No. 70, recommended for duty between 2300 and 2850 F; Gun-Ram No. 80, a gunning refractory material, and Ramtite Gun-Mix No. 23, a heat setting gunning refractory material. *The Ramtite Co.*

For more facts, circle No. 833 on p. 18

Thermocouple Elements

Gordon Bulletin, Form No. 14-15-54, illustrates and describes the line of Serv-Rite thermocouple elements and bare thermocouple wire. Also gives considerable general application data for the various types of elements and the different metals. *Claud S. Gordon Co.*

For more facts, circle No. 839 on p. 18

Air Tools

Bulletin No. 38-A illustrates and describes air tools for the foundry, steel mill, production line and assembly plant. Diagrams and specifications for the various tools are listed. Photos showing actual operations are also included in the catalog. *Rotor Tool Co.*

For more facts, circle No. 829 on p. 18

Oil Burners

Bulletin No. 107 contains complete information including operating principles, applications, dimensions and output data on the Thermal High Velocity Oil Burners. Also covers gas burners, heat exchangers, and air heaters. *Thermal Research & Engineering Corp.*

For more facts, circle No. 834 on p. 18

Non-Ferrous Alloys

Folder is available listing non-ferrous alloys for yellow brass castings, pure copper castings, medium red brass castings, nickel and nickel bronze castings, aluminum bronze hardener, deoxidizer for brass and bronze and many others. *Alloys and Products, Inc.*

For more facts, circle No. 840 on p. 18

Aluminum Solder

"Better Castings," Vol. XXIV, No. 10, points out that "Falls" Aluminum Solder is a low melting point solder which requires no special flux or handling. Also discussed are "Falls" Ferro Aluminum Alloys and Everdur Casting Ingots. *Niagara Falls Smelting & Refining Div.*

For more facts, circle No. 830 on p. 18

Ball Bearing Trolley

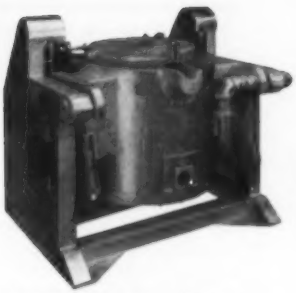
Book 2536 covers an entirely new line of ball bearing trolleys for overhead conveyors. Contains specification data for the selection of new trolleys, or of replacement trolleys for existing installations. Includes application and maintenance information. *Link-Belt Co.*

For more facts, circle No. 835 on p. 18

Scraper Plates

Bulletin F-108 describes the Flexco Scraper Plate for joining conveyor belts where scrapers and plows are used. Tells how the top plates of these fasteners are beveled on both ends so the scraper will readily ride over them. List prices are also included. *Flexible Steel Lacing Co.*

For more facts, circle No. 841 on p. 18



Lindberg-Fisher type MNP nose-pour tilting crucible furnace. Pouring lip is located in the axis of tilting providing a constant pouring arc regardless of degree of furnace tilt. Capacities up to #800 crucible with brass, up to #1000 crucible with aluminum. Oil or gas fired. Described in Bulletin 57-A.

Lindberg-Fisher Electric Resistance Melting and Holding Furnace equipped with heavy duty resistance elements which give uniform distribution of heat, insuring long element and pot life. Capacities 250 to #1000 crucible.

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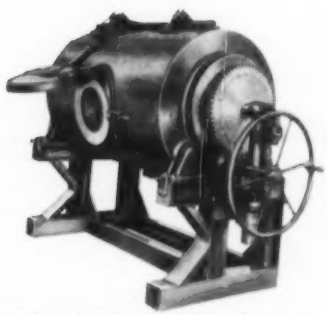
Because Lindberg-Fisher builds *all* kinds of melting equipment ... gas ... oil ... electric ... induction, and Carbon arc ... L-F engineers are able to recommend, without prejudice, the proper type of furnace for your particular melting requirements.



Lindberg-Fisher Simplex Rotary Open-Flame Furnace. Capacities to 2400 lbs. aluminum. 6000 lbs. brass. Oil or gas fired. Described in Bulletin 29-A.

Lindberg-Fisher type BB1 Hand-Tilt Crucible Furnace. Tilting mechanism consists of a hand wheel, driven through machined worm gear and pinion reducing gears. Capacities 50 to #400 crucible. Oil or gas fired. Described in Bulletin 400.

Melting specialists for 25 years
Sales and service offices in principal cities

Lindberg-Fisher type SF stationary crucible furnace features rapid melting and is recommended for general foundry casting work. Capacities 30 to #400 crucible. Oil or gas fired. Described in Bulletin 301.

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Letters

Letters should be addressed to *American Foundryman*, Golf & Wolf Roads, Des Plaines, Ill. Letters must be signed but will be published without signature on request.

Furnace Roof Insulation

In your February 1953 issue you have an article describing the use of vermiculite for electric furnace insulation. Would it be possible for you to give us more information on this product?

Olympic Foundry Co.
Seattle, Wash.

The article referred to is "Advantages of Insulating an Electric Furnace Roof" by Charles C. Spencer, Electric Steel Castings Co., Indianapolis. Mr. Spencer writes: "Vermiculite comes in many forms but the most practical we have found is a commercially available castable refractory having vermiculite as its base. All you have to do is add water to it so that it trowels smoothly and uniformly."

Flexible Ceramic

On page 33 of the October issue of AMERICAN FOUNDRYMAN you refer under Talk of the Industry to flexible ceramic coatings. Are these available commercially? Where?

D. M. SCOTT
Scott Castings Corp.
Buffalo, N. Y.

We are very much interested in the flexible ceramic coatings mentioned recently on the Talk of the Industry page.

J. R. PELLERIN, *Pres. & Mgr.*
Fonderie St. Maurice Co.
Cap de la Madeleine, Que.

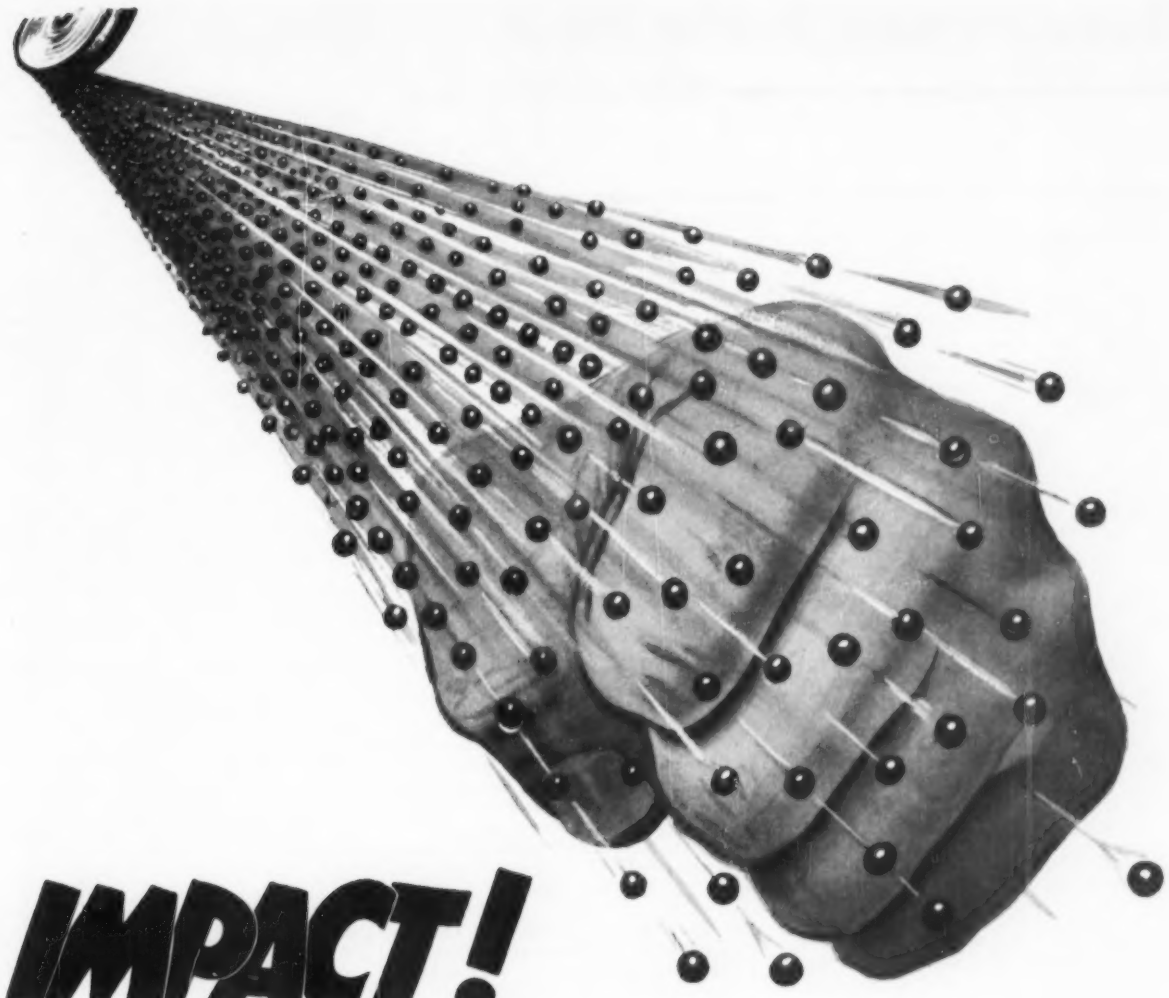
Flexible ceramic coatings have been developed by Armour Research Foundation. Detailed information can be obtained by writing to E. W. Wickert, assistant business manager, Armour Research Foundation, Illinois Institute of Technology, Chicago 16, Ill.

Foundry History

I was much interested in the topical notes on Casting Through the Ages on page 68 of the November issue of your most excellent publication — AMERICAN FOUNDRYMAN. I would be glad if you would indicate where I may obtain other details of a similar character as I am interested in the history of the foundry industry.

H. W. KEEBLE, *Dev. & Fdry. Exec.*
K & L Steelfounders & Engineers Ltd., Letchworth, England

This monthly feature of "The Foundrymen's OWN Magazine" is based on material gleaned from numerous sources. Some of the items are taken from the AFS publication DEVELOPMENT OF THE METAL CASTINGS INDUSTRY *by Bruce L. Simpson. This is believed to be the most comprehensive history of the foundry industry available. AFS member price is $3.00; non-member price is $6.00.*



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*U. S. Patent # 2184925 (other patents pending)

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PANGBORN'S 50th ANNIVERSARY—1904-1954

Foundrymen in the News

Stowell C. Wasson has been elected vice-president in charge of operations for National Malleable and Steel Castings Co., Cleveland. Since 1943 he has been manager of the company's Chicago and Melrose Park plants. In his new position, which was held by the late Walton L. Woody, Mr. Wasson will have general responsibility for operations at National's plants in Cleveland, Chicago, Indianapolis, Sharon, Pa., Melrose Park, Ill., and Phoenix, Ariz. Mr. Wasson is a director of National and has been with the company since 1911. He began his career in the Purchasing Dept. After serving 13 months in the Quartermaster Corps in World War I, he rejoined National, working in both operations and sales. In 1921 he was made sales manager, and in 1929 manager of the Indianapolis Works. He was made a director of the company in 1947. Mr. Wasson is a founder and past president and chairman of the board of the Foundry Educational Foundation, and is a director of the American Foundrymen's Society.

J. A. Ackermann has been appointed chief engineer of Elwell-Parker Electric Co., Cleveland. He succeeds **J. C. Erickson** who resigned due to ill health.

Ray P. Dunn has been named director of metallurgy for the East Chicago and Toledo plants of U. S. Reduction Co.

Arthur W. Ostrander has been appointed general sales manager of Enterprise Engine and Machinery Div., General Metals Corp.

Hjalmar A. Anderson was recently appointed chief project engineer of Lindberg Industrial Corp., Chicago.

Robert M. Stecker has joined the grinding wheel sales staff of Electro Refractories & Abrasives Corp., Buffalo. Wisconsin is his territory and Milwaukee his headquarters.

Jess Edwards has been named Detroit area sales manager of Pioneer Foundry Co., Jackson, Mich., and **Nelson Dumas**, former vice-president of Trojan Castings of Jackson, has been named sales engineer of Pioneer.

Harrison O. Ash has been elected president and general manager of Aluminum Industries, Inc., Cincinnati.

David E. Perkins has been appointed New England sales representative of Harrison Abrasive Div. of Metals Disintegrating Co., Inc., Elizabeth, N. J.

George L. Hoobler has been promoted to the Pittsburgh Technical Field Section of the Development and Research Div., International Nickel Co., Inc.

Paul Zeigler, director of Kaiser Aluminum and Chemical Corporation's Department of Metallurgical Research at Spokane, has been transferred to the company's headquarters at Oakland, Calif. As a result of Mr. Zeigler's move, **Dr. D. W. Smith**, associate director of Metallurgical Research at Spokane, will assume the duties of laboratory manager in addition to his present post. **S. E. Maddigan**, head of the Mechanical Evaluation Section, has been made assistant director of the department.

Dr. Kenneth G. Carroll has joined Bayonne (N. J.) Research Laboratory of International Nickel Co., Inc., as head of the newly-created Physics Section.

C. T. Haller, Jr. has been appointed in charge of the Pittsburgh Technical Field Section of the Development and Research Div. of International Nickel Co., Inc.

Richard L. Henson has been named assistant advertising manager of Simplicity Engineering Co., Durand, Mich.

Harry E. Gravlin has been appointed vice-president and general manager of the Claude B. Schneible Co., Detroit.

Roy Dehn has been appointed director of Engineering of the Cleveland Crane & Engineering Co., Wickliffe, Ohio.

Carl A. Larson, Reliance Pattern Works, Chicago, was re-elected president of the Chicago Foundrymen's Association November 29. Joseph Vilbig, Fox Valley Foundry Co., Aurora, Ill., was elected vice-president. R. H. Lehmpuhl, Sheffield Foundry Co., Chicago, was elected secretary-treasurer and J. R. Shumway, C. W. Shumway & Sons, Batavia, Ill., was named a director. Mildred Kosar continues as executive secretary at 343 S. Dearborn Street, Chicago 4.

Hamilton M. Ross was appointed manager of operations of the Conveyors Div. of Hewitt-Robins, Inc., Stamford, Conn., and **Harold E. Murken** was appointed manager of conveyor system sales at Hewitt-Robins.

Norman T. Bauer has been appointed service engineer for the Chicago sales territory of Acheson Colloids Co., Port Huron, Mich.

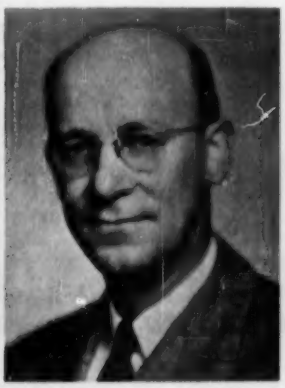
Leonard J. Shorek has been named engineer and district representative for the Detroit territory of Hauck Manufacturing Co., Brooklyn, N. Y.

R. E. Vaughn was appointed Chicago district manager of Peninsular Grinding Wheel Sales Corp., and **R. J. Kervick** was appointed district manager of the Philadelphia area.

Boyd M. Johnson has been appointed general manager of Refractories Div., Carborundum Co., Perth Amboy, N. J. Mr. Johnson succeeds Clarence E. Hawke, vice-president of Carborundum Co. He has been with the company since 1920.

continued on page 26

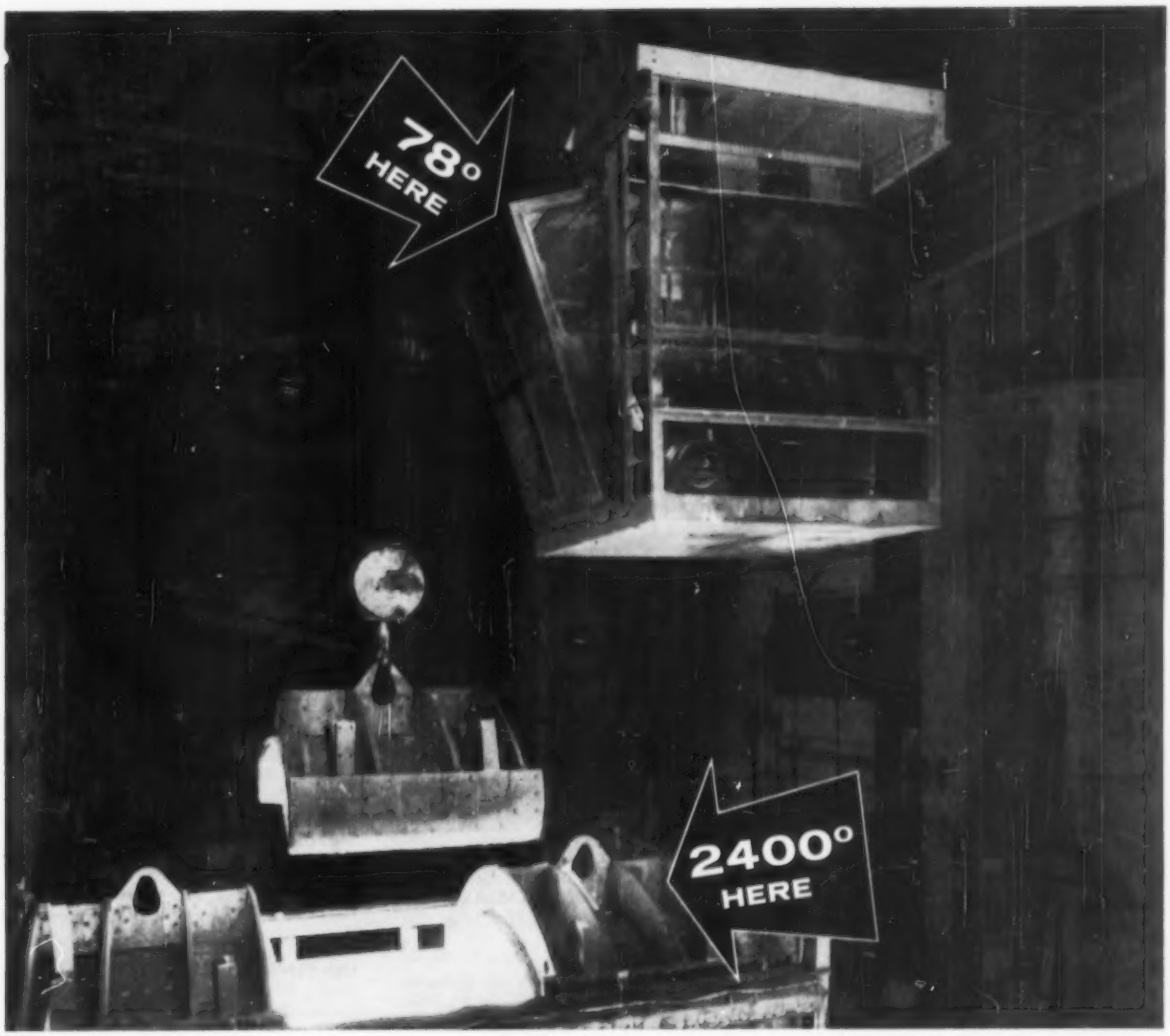
A. W. Ostrander . . . sales mgr.



S. C. Wasson . . . vice-pres.

J. A. Ackermann . . . chief engr.

R. P. Dunn . . . promoted



Blaw-Knox keeps crane cab temperatures down when furnace heat goes up

When the lid is off this 2400 F furnace for charging, its heat rises to surround the crane cab—making work practically impossible. To avoid the major work problem that such excessive heat creates for many foundries, the Rolls Division foundry of Blaw-Knox installed a Dravo Crane Cab Conditioner.

Like Blaw-Knox, foundry operators everywhere find that Dravo Conditioners are the answer to their overhead crane "hot spot" dust, dirt or fume problems. With Dravo Conditioners, cab temperatures are held at a 75-85F maximum, while ambients may soar as high as 180 F. In addition to holding cab temperatures to a comfortable, efficient work level, Dravo Conditioners also remove dust, dirt and fumes from air entering the cab and provide year-round ventilation.

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No matter where they're put to work, Dravo Industrial Air Conditioners pay big dividends by providing effective protection from excessive heat, dust, dirt and fumes. We'd like to tell you more about how these efficient, rugged, easy-to-install units can help you. Why not mail the coupon now or phone the nearest Dravo sales office!

Dravo Corporation, Air Conditioning Department
Fifth and Liberty Avenues, Pittsburgh 22, Penna.

DRAVO

☐ Please send Bulletin 1301A "Crane Cab Conditioners."
☐ Please have a representative call at no obligation to me.

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COMPANY _____
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For more data, circle No. 872 on postage-free Reader Service card on p. 17 or 18

R. S. Minning . . . sales rep.

R. C. Yetter . . . midwest rep.

G. S. Marks . . . central rep.

J. L. Heckler . . . with Stoller

continued from page 24

Robert S. Minning has been named Northern Ohio sales representative for Cleveland Metal Abrasive Co., Cleveland.

Glen S. Marks, McKeesport, Pa., has been appointed as the central area sales and service representative for Shallway Corp., Connellsville, Pa., and **Richard C. Yetter**, Chicago, has been appointed midwestern sales and service representative for Shallway.

Joseph L. Heckler has been appointed Northern Ohio and Northwestern Pennsylvania sales representative for Stoller Chemical Co., Akron, Ohio.

Henry J. Fisher has joined the Metallurgy Dept., General Electric Company Research Laboratory, Materials and Processes Section, Schenectady.

Joseph Leaveront has been appointed chief industrial engineer of Hamilton Foundry & Machine Co., Hamilton, Ohio.

G. Ray Friedrich has been appointed Southwest sales representative for Beardsley & Piper Div., Pettibone Mulliken Corp., Chicago. He will cover Southern Illinois, Western Indiana, Western Tennessee, Arkansas, Colorado, Kansas, Louisiana, Missouri, Oklahoma and Texas.

Fred C. T. Daniels retired as vice president of research and development for Macintosh-Hemphill Co., Pittsburgh, on November 1.

Admiral Alan G. Kirk has been elected president of the Mercast Corp. Admiral Kirk is also chairman of the board of Mercast.

Robert Forrest has been appointed service sales engineer of Samuel Greenfield Co., Inc., Buffalo. Mr. Forrest was formerly vice-president and works manager of Lakeside Bronze, Inc., Buffalo.

A. T. Olsson has been named an assistant sales manager of Acheson Colloids Co., Port Huron, Mich.

Herbert H. Meinert has been appointed sales representative for the Michigan territory of United States Graphite Co., Saginaw, Mich.

D. T. Wellman, president of Wellman Bronze & Aluminum Co., Cleveland, has been elected president of the Magnesium Association; **James E. Pepall**, president, Magnesium Co. of Canada, Ltd., has been elected vice-president; **J. V. Cosman**, president, Superior Bearing Bronze Co., has been reelected treasurer; and **Jerry Singleton** and **Miss Martha I. Hansen** of New York will continue as executive secretary and assistant secretary, respectively.

S. Whitney Dickey has been appointed assistant vice-president of the Brake Shoe & Castings Div. of American Brake Shoe Co. Mr. Dickey was formerly eastern district sales manager for the division in New York.

C. L. Fell has been elected vice-president in charge of marketing of the American MonoRail Co., Cleveland. Mr. Fell is also a member of the Board of Directors for American MonoRail.

Andrew K. Kolar has been appointed purchasing agent for Link-Belt Co., 300 West Pershing Road, Chicago. He replaces Henry M. Coen, who is retiring after 45 years of service with the company.

Jay P. Simpson has been appointed manager of the Gulf Coast Sales and Service Laboratory of Baroid Div., National Lead Co.

Dan Pendergast has been appointed New England sales manager of Linoil for Archer-Daniels-Midland Co., Cleveland.

Charles W. Felker has been transferred to Houston as sales representative of the Gulf Coast Div., National Lead Co.

Lewis F. Herron has been elected president of the American Council of Independent Laboratories, Inc. Mr. Herron is president of the James H. Herron Co., Cleveland.

H. J. Fisher . . . joins G-E

J. Leaveront . . . chief engr.

F. C. T. Daniels . . . retires

G. R. Friedrich . . . joins B & P

"wedded" to your present abrasive?

If, for one reason or another, you're committed to a particular brand of abrasive—just turn the page and never mind about CUT STEEL! However, if you're not "wedded", then here's news for you. There's a revolutionary, new type of abrasive that sets a *much higher* standard for the cleaning of castings and forgings. Actually *cut* from high quality alloy steel, it's appropriately named CUT STEEL—and it does an incredibly fine job of cleaning.

In cleaning speed, finished appearance, length of service and low maintenance costs—CUT STEEL will definitely outperform all other abrasives. Yet, Grade "A" CUT STEEL ***sells for less than most cast steel shot*** and Grade "B" ***costs no more than most malleable shot!***

Therefore, if you're "free" to investigate better ways to clean your castings and forgings—be sure to try new CUT STEEL! Samples, prices or trial order, gladly, on request. Write today!

Sooner or later, you too, will change to CUT STEEL!

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ABRASIVE

ANNEALSHOT and SUPER-ANNEALSHOT

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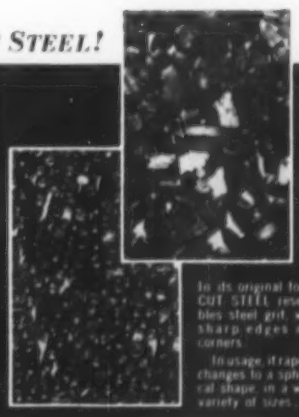


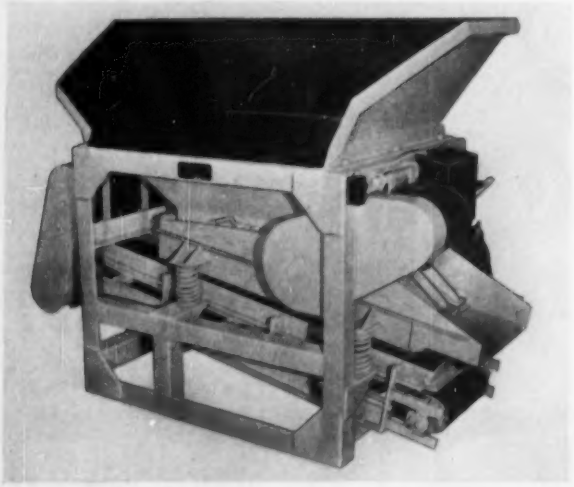
In its original form CUT STEEL resembles steel grit, with sharp edges and corners.

In usage, it rapidly changes to a spherical shape, in a wide variety of sizes.

(ADVERTISEMENT)

FOUR MEN handle all of the molding operations for eight cope and drag stations on this above-floor B&P Rotomold unit at the American Foundry & Machine Co., Salt Lake City, Utah. Cope and drag patterns for each job are mounted on a single pattern board at eight roller conveyor stations on the Rotomold table. The Stationary Sand-slinger rams any number of different jobs. *Write for full information to Beardsley & Piper, Div. Pettibone Mulliken Corp., 2424 N. Cicero Avenue, Chicago 39, Illinois.*

Cost-Cutting Equipment in the News



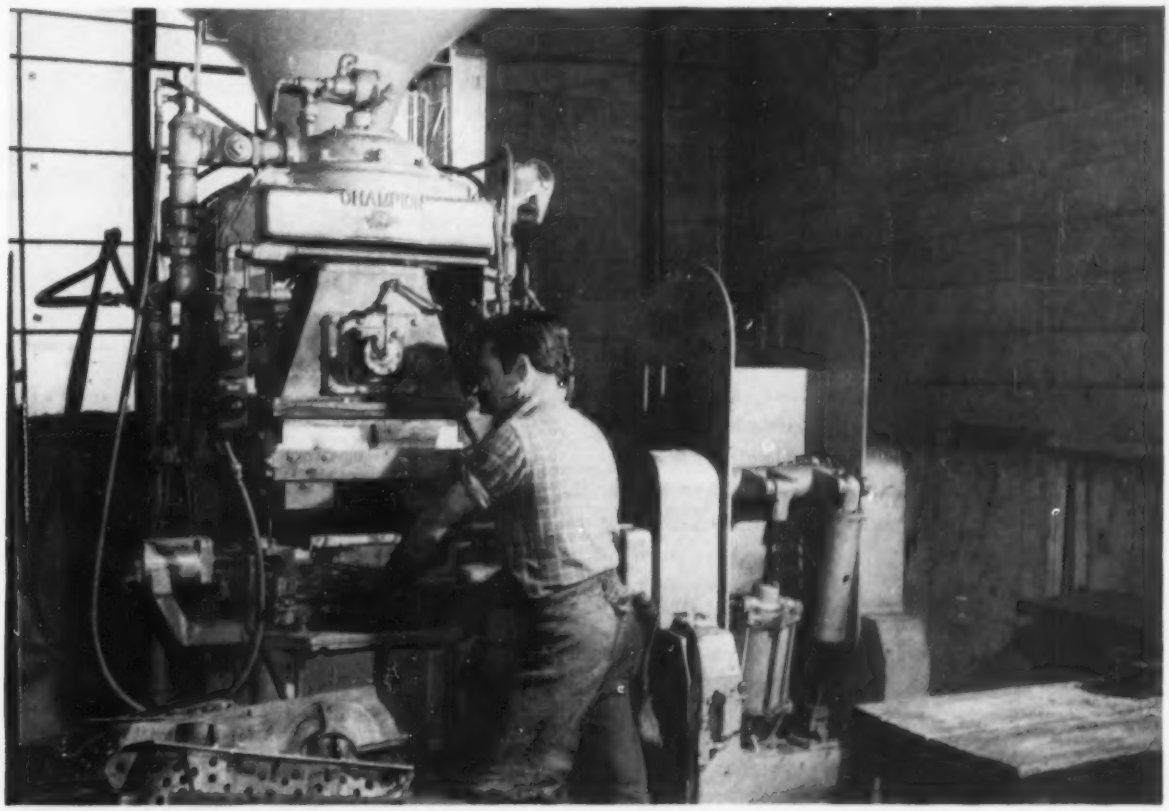
THE NEW ABOVE-FLOOR Model "60" Preparator, introduced by Beardsley & Piper, has greatly simplified the installation of Speed-muller-Preparator units. The installation costs of these complete sand conditioning and mulling units is now lower than ever. *Write to Beardsley & Piper, Div. Pettibone Mulliken Corp., 2424 N. Cicero Avenue, Chicago 39, Illinois for full information and prices.*

SMALL SIDE FLOOR WORK is handled efficiently at the Empire Pattern & Foundry Co., Tulsa, Oklahoma on two inexpensive J&J Portable Jolt-Squeezers. Rammed molds are set out on the floor for pouring. *Full information on J&J machines may be obtained by writing to Beardsley & Piper, Div. Pettibone Mulliken Corp., 2424 N. Cicero Avenue, Chicago 39, Illinois.*

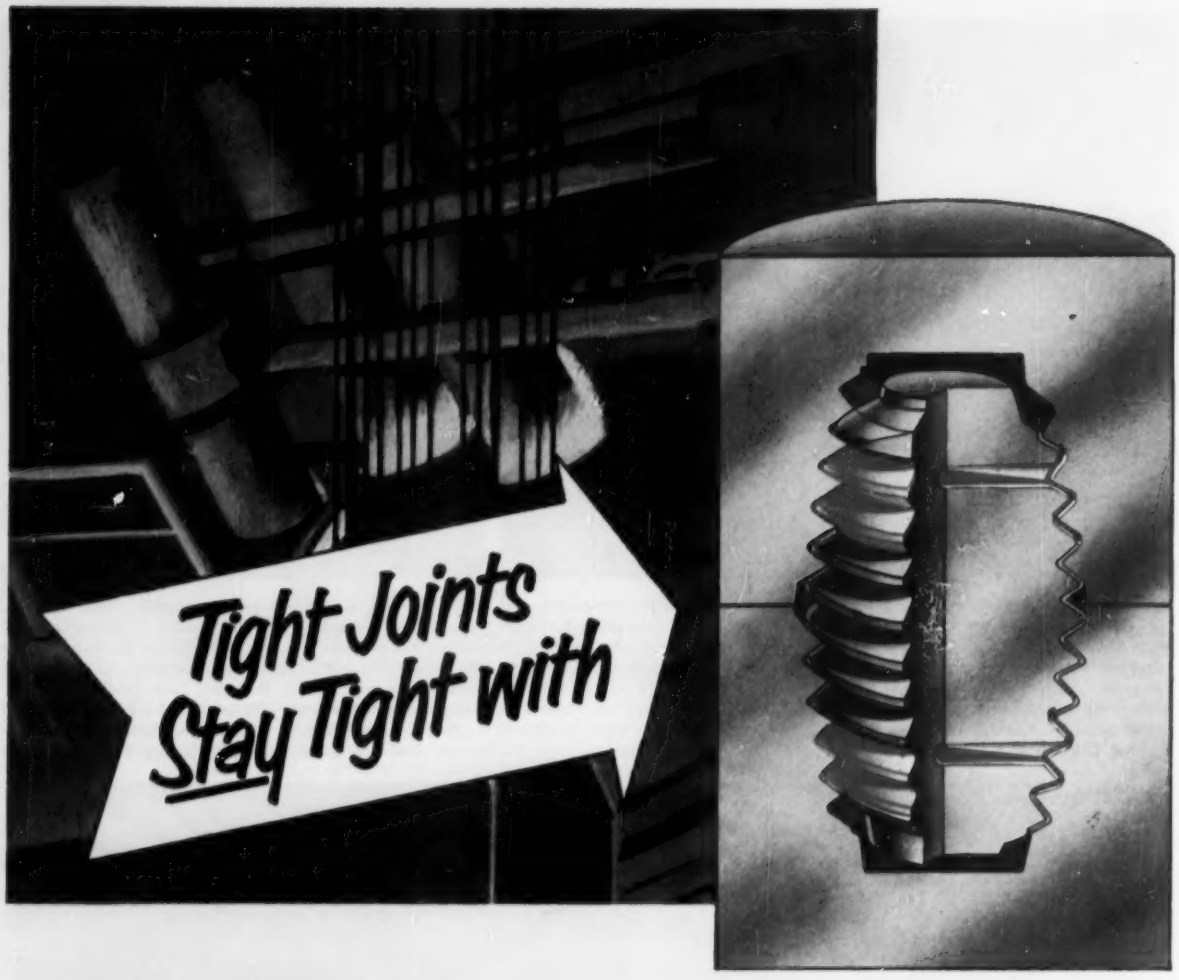
For more data, circle No. 842 on postage-free Reader Service Card on p. 17 or 18

AUTOMATIC CONTROL of sand preparation has been further simplified and refined by a new Skiptrol device. Skiptrol, introduced by Beardsley & Piper, accurately controls loading of the Speedmullor skiphoist bucket. The diaphragm pressure switch located in the skiphoist bucket is shown here. Skiptrol is one of a complete line of automatic controls manufactured by B&P. These include Mulltrol, Mulltrolmatic, Blomatic, and Cormatic. *New detailed information on Skiptrol is obtainable from Beardsley & Piper, Div. Pettibone Mulliken Corp., 2424 N. Cicero Avenue, Chicago 39, Illinois.*

ALL OF THE CORES required for operations at the Belnap Manufacturing Co., Bridgeport, Connecticut are made from core sand thoroughly mulled in this Model 3½ Mulbaro. Belnap, manufacturers of an outstanding line of valves, depends on this Mulbaro, Speedmullors and a Swingslinger in their very efficient foundry. *For more information write to Beardsley & Piper, Div. Pettibone Mulliken Corp., 2424 N. Cicero Avenue, Chicago 39, Illinois.*



OVER 1400 forty pound double transmission cores are produced each day on this Champion Cormatic Unit at the Newnam Foundry, Kendallville, Indiana. The core sand for this exacting job is mulled in a Speedmullor. Cores blown on the Champion Blomatic Core Blower at left, are rolled over and drawn on the Rol-A-Cor Unit at right. *Champion Cormatic units are described in a new bulletin available from Beardsley & Piper, Div. Pettibone Mulliken Corp., 2424 N. Cicero Avenue, Chicago 39, Illinois.*



NATIONAL PITCH-RESERVOIR NIPPLES*

TRADE-MARK

THE NEW PITCH-RESERVOIR NIPPLE, an exclusive "National" product, is another major contribution by National Carbon Company to more efficient electric furnace operation. You can now be sure that tight joints will stay tight under normal load and service conditions.

"NATIONAL" PITCH-RESERVOIR NIPPLES, designated Type PR-F, are now available for electrode diameters from 14" to 24". Thoroughly proved in service, they are identical in strength, size, shape, tolerances, composition and quality to our standard, tapered, graphite nipples. Talk it over soon with your National Carbon Company electrode representative.

***PATENTS PENDING**
EXCLUSIVE DESIGN

HERE'S HOW IT WORKS:

Reservoirs near each end of the nipple contain pitch. As the electrode column becomes hot in service, the pitch flows from the reservoirs into the threaded sections of the joint and cokes out, cementing and locking the threads of the nipple and sockets together.

FOR ELECTRODES AND ELECTRODE SERVICE...
Rely on NATIONAL CARBON COMPANY!

The term "National" is a registered trade-mark of Union Carbide and Carbon Corporation

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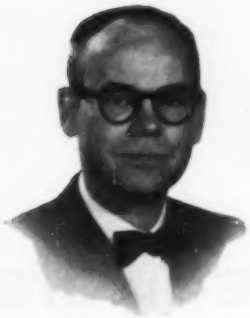


Talk of the Industry

MODERN MANAGEMENT PRINCIPLES must be followed if foundries are to grow, said George W. Cannon, co-founder of Campbell, Wyant & Cannon Foundry Co., at the recent annual meeting of the National Foundry Association. Only well-planned management can take on all the expenditures demanded for metallurgy, research, engineering, mechanization, training, advertising, selling, and cost accounting, and still end up with a low competitive cost in keeping with the business they are doing, he pointed out. He advised: (1) plan to develop your organization; (2) be strong on methods engineering; (3) develop time standards and wage incentives; (4) set up management incentives; (5) establish production control; (6) practice good labor relations; (7) use cost accounting and variable budgets; (8) profit from progress in metallurgy; (9) advance through orderly research and experimentation; and (10) revive apprenticeship training.

MAKE THE CASTING BREATHE is the way Ross L. Gilmore, president, Superior Steel & Malleable Castings Co., put it in explaining good casting design at the annual meeting of the Gray Iron Founders' Society. If you take a short breath, only the upper part of the lung works. Take a deep breath and the entire lung works. To make the most of a casting, every part must be functional, must bear some of the load, like the lung when you breathe deeply. Make the casting breathe!

HOUSING APPLICATION FORMS for the 1955 AFS Convention—Houston, Texas, May 23-27—will reach the foundry industry through AMERICAN FOUNDRYMAN rather than by direct mail as in the past. Readers of "The Foundrymen's OWN Magazine," who will find the form in the February issue, are urged to mark it and mail it promptly to facilitate early processing of housing applications.

COMPETITION BECOMES MORE KEEN each day, as in any business, and every indication points to a continuation of this trend in coming years, James H. Smith, general manager, Central Foundry Div., General Motors Corp., stated recently before the annual meeting of the Foundry Equipment Manufacturers' Association. The foundryman must be ever alert to improved methods of producing castings, new developments, and anything which will produce a better casting at a lower cost. But America has thrived upon competition. In fact, our higher standard of living, our free enterprise system, all stem from competition, Smith said. Experience has proven that competition reduces costs, stimulates improvements, new products, and brings manifold benefits to the consuming public. In our industry, competition means harder work and more aggressive selling in the future than at any time since 1941. We in the foundry business should welcome the return of competition, provided we are prepared for it. Any foundryman worth his salt is finding the return to normal competitive conditions a worthwhile challenge, he declared.

/Herbert P. Scobie

Dedicate

Above. . AFS President Frank J. Dost, Sterling Foundry Co., Wellington, Ohio, dedicates Society headquarters. Other speakers included, left to right, Ralph J. Teetor, Cadillac Malleable Iron Co., Cadillac, Mich., Past Director Frank C. Riecks. Ford Motor Co., and Kenneth G. Meyer, mayor of Des Plaines. In background is Past President I. R. Wagner, Electric Steel Casting Co., Indianapolis.

Right. . Library and conference room overflowed with foundry industry leaders and other guests attending dedication.

Registering are AFS Directors C. E. Brust, Eastern Malleable Iron Co., Naugatuck, Conn. (with pen), and Claude B. Schneible, Claude B. Schneible Co., Detroit.

"WE HOLD EVERY MAN a debtor to his profession, and in this technical center it will be our aim, as members of AFS to discharge continuously that debt." So spoke AFS President Frank J. Dost, Sterling Foundry Co., Wellington, Ohio, paraphrasing the words of Francis Bacon, in dedicating America's first foundry technical center in Des Plaines, Ill., November 18. Attended by some 300 foundry industry leaders and city officials, the dedication marked the successful conclusion of a four-year campaign of planning, fund raising, and construction.

Held in the library and conference room of the new building, the dedication ceremony was carried out with simple dignity and warm appreciation of the efforts of all members of the industry who had made the new office building possible. President Dost paid tribute to those who had led

AFS Foundry Technical Center

Ribbon cutting at entrance symbolizes official opening of new AFS headquarters. President Frank J. Dost wields scissors. Assisting, left to right, are: Past President Ralph J. Teetor, General Manager Wm. W. Maloney, and Past Director Frank C. Riecks. Looking on, left to right, are: Director Thomas Kaveny, Jr., Herman Pneumatic Machine Co., Pittsburgh, Pa., Past Director Vaughan Reid, City Pattern Foundry & Machine Co., Detroit, Prof. George J. Barker, University of Wisconsin, and Past Director Frank W. Shipley, Caterpillar Tractor Co., Peoria, Ill.

AFS headquarters building houses all Society office facilities. High center section at left of entrance is library. Cast bronze letters for Society name were provided through courtesy of Christensen & Olson Foundry Co., Chicago. Bronze AFS symbol is gift of University of Alabama Student Chapter.

Refreshments were served after dedication ceremony. At table beside Mrs. Thomson is Past Director James Thomson, Continental Foundry & Machine Co., East Chicago, Ill., and at his right, H. A. Forsberg, Continental Foundry & Machine Co.

the campaign to completion, stating that he was privileged to dedicate the building only by force of circumstances and passage of time. Credit rightfully belongs to many others too numerous to mention, he stated.

He singled out the late Walton L. Woody, National Malleable & Steel Castings Co., Cleveland, and Ralph J. Teetor, Cadillac, Mich., both past presidents, and Frank C. Riecks, Ford Motor Co., Dearborn, Mich., past national director, for special recognition. He told how Mr. Woody proposed the headquarters building during the 1950 AFS Convention but never saw it during construction or after completion.

Mr. Teetor, President Dost pointed out, was chairman of the Housing Committee from the start and was responsible for finding an appropriate building site, making preliminary plans, and getting the job under way. He was, Dost said, responsible for raising over $225,000 through contributions from members of the Society, the chapters, and the industry. As a result, the building is unencumbered by notes, mortgages, or bonds.

In reply, Past President Teetor declared it was a committee project, that AFS owed him nothing for his part in securing the building.

Once the design of the building had been approved and it came time to draw up plans and specifications, and to engage in actual construction, AFS turned to Frank Riecks, Dost said, in introducing him. The AFS president thanked Riecks for his personal effort and expressed appreciation to Ford Motor Co. for making him available.

Dost introduced the past presidents who followed Walton Woody in carrying on the building campaign: Walter L. Seelbach, Superior Foundry Co., Inc., Cleveland (1951-52); I. R. Wagner, Electric Steel Castings Co., Indianapolis, Ind. (1952-53); and Collins L. Carter, Albion Malleable Iron Co., (1953-54).

Wm. W. Maloney, AFS general manager, opened the dedication ceremony by introducing Dr. Ralph L. Lee, Lee Hobby Foundry, Birmingham, Mich., who delivered the invocation. Mayor Kenneth G. Meyer, welcomed the Society to Des Plaines.

The brief ceremony came during an afternoon open house that gave everyone an opportunity to examine the Society's new facilities. These include, in addition to the library and conference room, offices for the organization's major activities such as the Technical Dept., Convention & Exhibits Dept., AMERICAN FOUNDRYMAN, Safety & Hygiene & Air Pollution Control, Education, Membership, Book Sales, Administration, and Accounting. There is also a large stock and mailing room, an addressing room, and lunch room.

A buffet lunch followed the dedication.

In the evening, some 140 AFS officials, chapter chairmen, representatives of other foundry societies, industry leaders, and their wives, attended a dedication dinner at the Edgewater Beach Hotel, Chicago. AFS President Dost presided and again paid tribute to those who had made the building possible. He cited particularly the work of Wm. N. Davis, director of safety & hygiene & air pollution control, who since July had devoted his entire time to expediting completion of the building.

Banquet at Edgewater Beach Hotel, Chicago, concluded official opening of America's first foundry technical center.

LAWRENCE WININGS / *Foundry Superintendent*
Wagner Malleable Iron Co., Decatur, Ill.

Malleable Gating

Casting design is the most important of three factors in gating and feeding of malleable castings. The paper was presented at the Metals Casting Conference, Purdue University.

■ Gating practice at Wagner Malleable is based on four objectives:

1. Sound castings free from shrinks, cracks, dendrites, and slag or dirt inclusions.
2. Economical gate removal.
3. Highest possible yield.
4. High rate of production.

The first is most important; it is vitally important to make sound castings in order to stay in business. Most of this discussion will deal with efforts to produce sound castings. However, the other three points should not be overlooked or minimized because they are important from a production and cost standpoint.

Take the principle of feeding. It is well known that there is considerable volume change in metal on cooling from a liquid at pouring temperature down through solidification. A shrink in the form of a void or porosity as encountered in malleable iron, occurs if this volume change is allowed to take place without compensation. The problem in feeding then resolves itself into supplying sufficient liquid metal to any section of the casting while this volume change is taking place in that section. This liquid metal can be supplied in three ways:

1. Since some of the metal starts to solidify while the mold is still being filled, the volume change in this metal will be taken care of by liquid metal being poured at that time.
2. Light sections will be fed liquid metal from adjoining heavier sections.
3. From external feeders or risers.

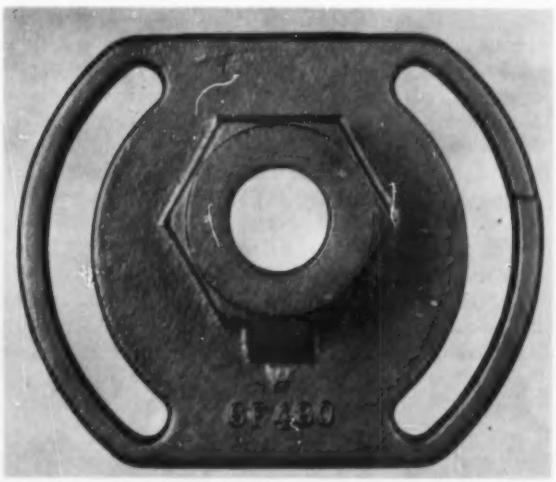


Fig. 1 . . Hub heavier than flange caused shrinks around hub. Light section near slots often cracked.

Fig. 2 . . Pad at top permits feeding hub. Web in slots stopped cracking, is subsequently machined off.

It becomes apparent that to do an effective feeding job the following three things are necessary:

1. A casting of such design that the heavy sections that feed liquid metal to lighter sections may in turn be fed liquid metal from some source.

2. A gate opening or openings of sufficient size to remain hot and feed liquid metal to the heavy sections.

3. A feeder or feeders of sufficient size to supply liquid metal and to keep the gate opening fluid during solidification of the casting.

Casting design is perhaps the most important of these factors because it is often impossible to properly feed an improperly designed casting regardless of the number and size of gates and feeders.

It has been the practice in the author's plant to first consider design. This starts when a new job or prospective job is in the estimating or quotation stage. Those who will eventually have to do the rigging and gating study the print carefully and try to anticipate the problems which might arise. These problems are discussed with the sales engineer who in turn takes them back to the customer with recommendations for alterations or for investigation into the utility of the part to obtain ideas for alterations.

Past experience indicates that the most common alteration probably is addition of metal at the right place to facilitate feeding. This may be in the form of a gating lug or a fillet. In other instances it may be added finish on a finished surface. In some cases a heavy section that causes a gating problem can be lightened out without harming the utility of the casting. Still another practice is to add metal at one place and to lighten it at another to get a more uniform metal section which in turn gives more uniform cooling.

Figure 1 shows a part as originally designed. The hexagonal hub in the center is much heavier than the surrounding flange. As a result, there was a bad shrink all the way around this hub. In addition, a large percentage of these castings cracked in the thin narrow section on the outside of the slotted holes. In Fig. 2 a fillet was added on the edge of the casting into the hub to enlarge the area for sufficient gate opening and to feed hot metal into the heavy hub section. This eliminated the shrink. The part had $\frac{3}{32}$ in. finish all over the opposite face so the bottom of the slots were filled in $\frac{1}{16}$ in. This tied in the narrow outside section and prevented the cracks. The customer did not object to this change because it was removed in the machining operation at no extra cost.

Figures 3 and 4 show the drag side and cope side, respectively, of an automotive bracket. Shrinkage occurred along the entire rib section directly behind the bosses as well as along both end ribs. A large fillet in the cope along each end rib was added (Fig. 4). Also a cope fillet was added directly in front of the gate joining one of the end fillets and overlapping the drag fillet. This fillet was placed in the drag at this point because of bolt head interference in the cope. The drag fillet then overlaps the end fillet extending across the rib section to the heavy area on the opposite side. Using this method, shrinkage was eliminated with a single gate. Before the changes were made as many as four gates could not produce sound castings.

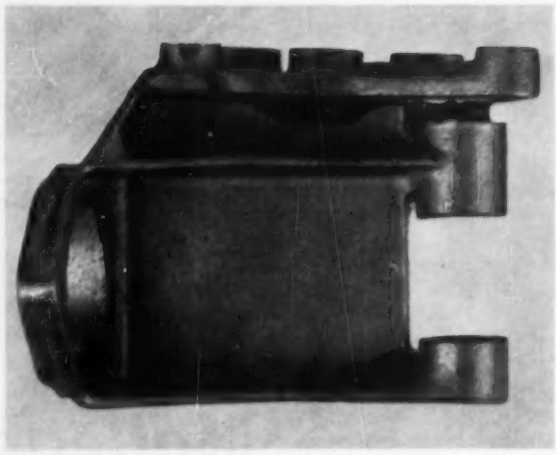


Fig. 3 . . Shrinkage occurred along ribs behind bosses and at end in drag of this automotive bracket.

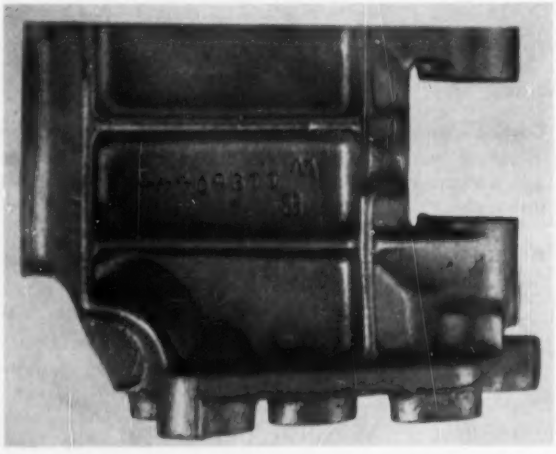


Fig. 4 . . Fillets along each end rib in cope produced sound casting with one instead of four gates.

Figure 5 shows a machine gun back plate and hand grip. This is made for Army Ordnance and as a small arms part must be free from all defects. Because of specifications this part could be gated only on the front of the plate or on the barrel. In either case there was considerable shrinkage at the heavy metal section at the top of the grip as shown in section in Fig. 6. A request was made to enlarge the core that forms the inside of the grip and thus lighten this section. Because a hole is drilled here to mount some of the trigger assembly, this request was denied. The problem was solved by adding finish inside of the barrel as shown in Fig. 7. The casting is gated on the barrel opposite the grip and the added finish indicated by the darkened area serves to feed hot metal around the barrel core to the area where the shrink formerly occurred. From this sectioned casting in can be seen that this area is now solid.

Figures 8 and 9 show changes made in an original design to obtain a more uniform metal section. The gear blank in Fig. 8 had a shrink all around the center boss. Scrap losses in the form of cracked ribs and cracks in the webbing were terrific. With permission of the customer, a redesign was worked out and

the result is shown in Fig. 9. The rib between the two bosses was enlarged to feed across from the gate to the center boss. Two of the holes were eliminated as were the ribs. The web was thickened all over and crack strips were added to both cope and drag at the gate. The casting as shown is now satisfactory with small scrap losses and is free of shrinks and cracks.

The small lever in Fig. 10 was first gated as shown, in the boss on the end. The lever itself is a round section for its full length and the knob on the end opposite the gate is spherical. All samples broken in the hard iron state looked sound. However, after annealing there was no strength in it whatsoever. It is actually a fact that many of them could be broken by hand. The fracture indicated a dendritic structure. The gate was moved to many different places but the result was the same. A shrink as normally expected could not be seen in the hard iron fracture but after knowing what to look for from the soft iron fracture, a white dendrite could be seen. The customer was ap-

Fig. 5 (Upper left) . . Machine gun back plate and hand grip.

Fig. 6 (Upper center) . . Shrinkage in heavy section at top of grip.

Fig. 7 (Above) . . Extra finish (dark area) eliminated shrinkage.

Fig. 8 (Far left) . . Bad design resulted in high loss from cracking.

Fig. 9 (Left) . . Redesigned gear blank eliminated shrinks and cracks.

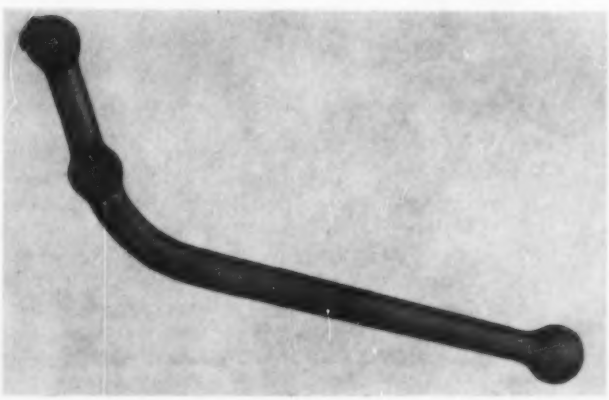


Fig. 10 . . Lever gated on end as shown or anywhere else, resulted in highly dendritic structure and low strength.

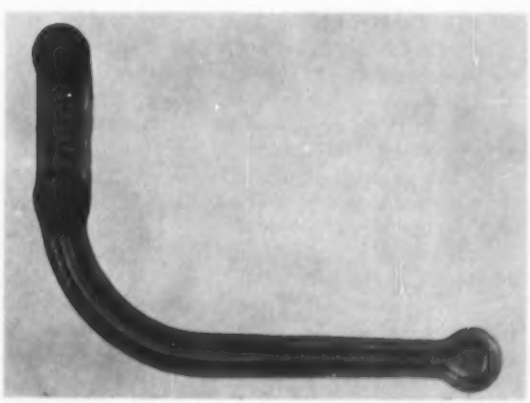


Fig. 11 . . Change to I-beam section, plus heavy portion between bosses for gating, gave sound casting.

proached and permission was given for a redesign. The I-beam section shown in Fig. 11 was the result. A heavy section between the bosses was provided for gating area. The casting is absolutely sound.

In determining the proper size of gates and feeders to do an effective job of gating there is no good rule of thumb. However, considerable work is being done in the study of ratio gating for malleable iron. It is likely that before too long foundrymen will be able to make some application of this in actual practice. Since up to now there have been no set rules, gating is a skill that has been developed by experience and judgment. It is a skill that cannot be learned in a few easy lessons but takes a lot of experience and experimenting in order for a person to become proficient.

A great deal of experimenting with gating is done at Wagner Malleable before making production pattern equipment. One molder is kept busy almost full time on experimental gating using either a single loose master or an experimental pattern. It pays off because it keeps to a minimum alterations of pattern equipment in the production stage.

Experimental castings are checked by fluorescent magnetic inspection for cracks, then broken up in the hard iron state to check for shrinks and porosity. If there is still any question as to the soundness of the casting it is annealed and sectioned. The sections are polished and etched by boiling in a one to one solution of hydrochloric acid and distilled water for 20 to 30 min. This will bring out the smallest traces of shrinkage or porosity.

Experience shows it is advisable to keep the following points in mind in regard to shape, size and type of feeders, and gate openings:

1. A gate opening or feeder as near circular in cross section as possible is most effective. This is true because a round section as the same area as a square section will have slightly less than 90 per cent as much surface area and therefore, gates and feeders of this shape will remain hot longer.

2. A feeder as close to the casting as possible will feed more effectively than one some distance away with a long neck since the neck will freeze faster.

3. A live feeder is more effective than a dead or blind feeder of the same size since it will contain hotter metal.

4. A countersink in the top of a feeder is advantageous in most cases.

As mentioned before, a casting must be free of slag and dirt inclusions to be sound. Strainer cores are used in almost all instances in the author's plant; they are not necessary in a few thin section jobs with a narrow gate opening. Also favored is an offset sprue or tail gate. That is with the down sprue cut 2 or 3 in. away from the strainer core and connected to the skim core with a cope runner. Figure 12 is an example of this arrangement. The inclusions in the trap above the skim core can be seen here.

Another runner arrangement found to be effective is to overlap a cope runner bar with a drag runner a short distance ahead of the feeder. Figure 13 shows a drag view of an arrangement such as this used in conjunction with the previously mentioned offset sprue. Figure 14 is a cope view of the same job. Note again the trapped inclusions above the skim core.

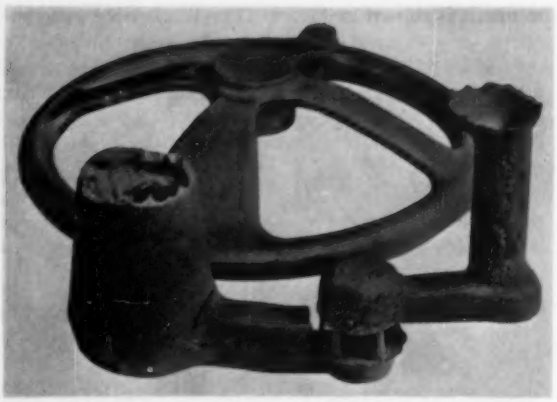


Fig. 12 . . Offset sprue, cope runner, and strainer effectively trap non-metallic particles.

Fig. 13 . . Drag view of system with alternate drag and cope runners with strainer near sprue.

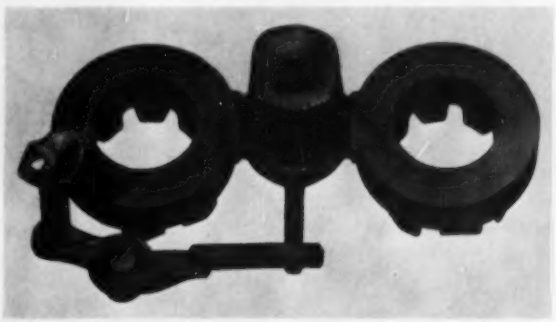
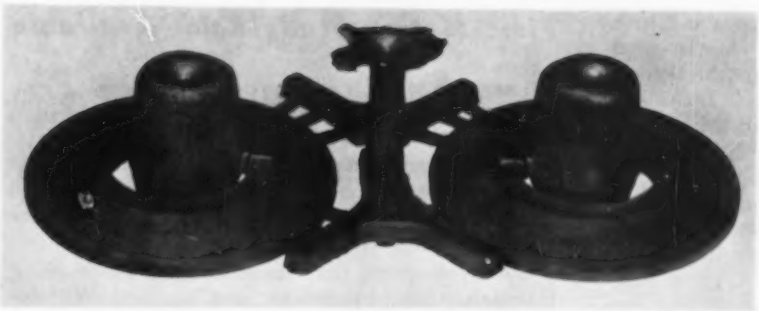


Fig. 14 . . Cope view of gating system in Fig. 13.

In this particular mold there are no trapped inclusions in the cope runner bar beyond the skim core. However, in a large percentage of the molds on this job a great amount of slag is collected along this bar.

This was a particularly troublesome job for inclusions. First it was rigged with a skim core located about 4 in. straight out from the feeder and connected to the feeder with a drag runner bar. An offset sprue trapped a great deal of slag but did not stop all of it. Losses were very high. With the arrangement shown here the losses from slag inclusions have been reduced to less than 3 per cent.



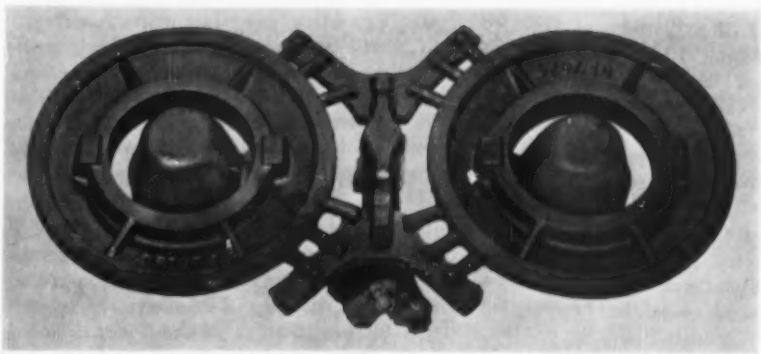


Fig. 15 (Upper left) . . Cope runners fill casting through finger gates.

Fig. 16 (Left) . . Drag view of Fig. 15. Casting, formerly gated into heavy inside flange, cracked frequently.

Fig. 17 (Above) . . Lug for inside feeder is above parting line.

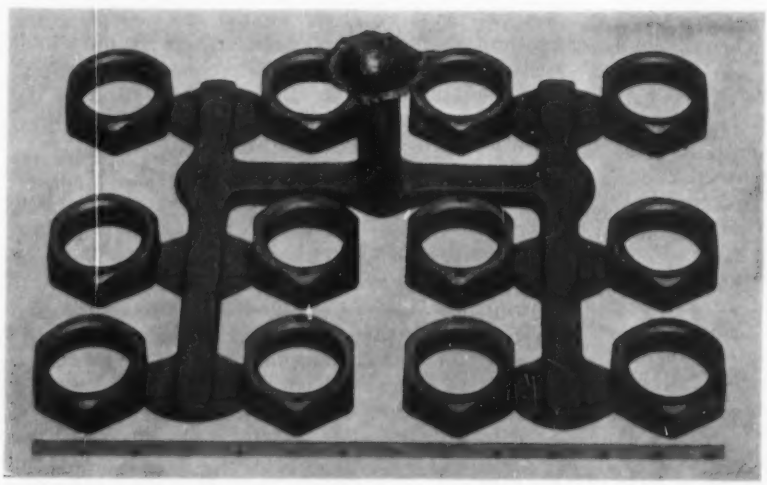


Fig. 18 (Left) . . Cope view of gating system for 1 ½-in. conduit coupling nuts with ingates on side. Grinding was expensive.

Fig. 19 (Lower left) . . Drag view of improved gating system with contact at bottom of casting instead of side.

Fig. 20 (Below) . . Most gates break off as shown. Projection gives no trouble in machining and requires no grinding.

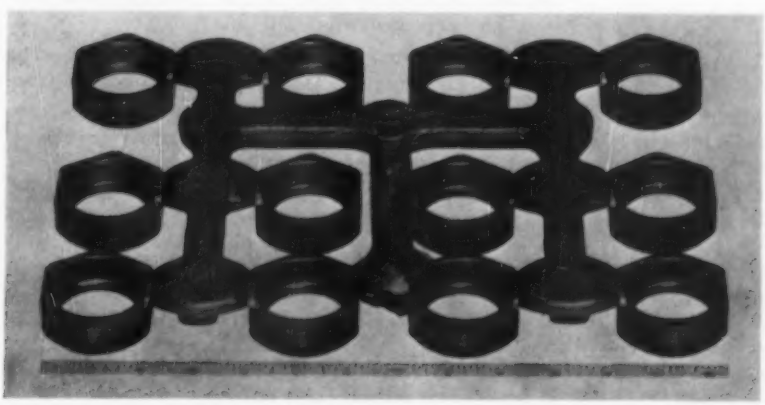


Figure 15 is a cope view of runner bar and ingate arrangement without an offset sprue. Here a cope runner is used with finger gates feeding off the bottom of the cope runner. In this view some small inclusions can be seen trapped in the cope bar. On this casting it is necessary to use a dead feeder since the outer flange is too thin to feed through. The gate opening was originally inside the heavy inner ring which can be seen in Fig. 16. This made gate removal difficult and in addition scrap losses were high because of cracks in front of the gate.

Next a top feeder directly above the driving lug was tried. This simplified gate removal but production was so low that the method was prohibitive. Finally adopted was the arrangement seen in Fig. 15 in which a gating lug was added on top of the casting directly above the driving lug. This opening is all above the parting line outside the ring with the break off point at the inner circumference of the ring. The gate lug is then ground off and the casting goes to the customer as seen in Fig. 17. The cracks that gave trouble in the original gating were eliminated.

Figure 18 is a cope view of a mold of 1½-in. electrical conduit coupling nuts. This was first gated in the side. Scrap losses were not high but there was some loss from broken in-gates and washed gates. In addition, because a good appearance is required on these parts, it was an expensive grinding job. In the present gating (Fig. 19), the gate comes into the bottom of the casting. This has eliminated washed gates and practically eliminated broken gates. Note that in this job no skim core is used; also note the inclusion trapped in the cope side of the runner bar.

Consider economical gate removal. The casting shown in Fig. 18, 19, and 20 is an example of what can be done. It is not possible, of course, to completely eliminate gate grinding except in a very few instances. It is possible quite frequently to make some improvement. It is preferable to gate on a flat surface rather than on a rounded one because the labor cost of grinding is less for grinding on a flat surface than for grinding to a contour. Also, wheel consumption is lower if a wheel can be dressed straight across the face rather than grooved. Wagner Malleable has been doing considerable gate removal by shearing recently and has found in many instances that this is more satisfactory than grinding. For this it is important to consider, while the job is still in the blueprint stage, how the casting can be held in a fixture, and if there is any choice in location of a gate, which location will be best for gate removal.

Returning briefly to design. In addition to making the difference between sound or unsound castings, proper design can make possible savings in all the factors affected by gating. A change in design which makes it possible to feed a casting with one gate instead of two or three gives a better yield and brings about a cost saving in gate removal. Also it can mean a higher production rate because of more pieces in a mold, or a smaller flask size when less of the plate area is taken up by feeders and runner bars. Many times a slight change in design will make it possible to make a job without feeder cores, top feeders, or chills that would otherwise be required. This again will mean a higher production rate at less cost.

Time-Motion Study Book Available

TIME AND MOTION STUDY FOR THE FOUNDRY, a symposium of selected articles relating time and motion study to the various operations in the foundry industry, has been issued by AFS. The book is presented to assist those interested in planning operations and evaluating performance in terms of time, and in the exercise of control with respect to time.

The book covers time study in terms of processes, materials, tools, equipment, and physical and psychological operating conditions. Time study fundamentals are applied to and standard data are developed for: squeezer molding, snap-flask operations, four-man molding units, and mechanized molding conveyor line operations. Besides telling how molding operations may be standardized, the book develops standard data for bench coremaking and core finishing. Fundamentals of standard data are also applied to cleaning room operations and the benefits of incentive applications are presented.

An incentive plan for the melt department is approached statistically, based on quality, quantity, and power savings. Another plan is described for applying indirect wage incentives that are effectively related to cost and production control. A chapter is devoted to a supervisory incentive plan to be used in conjunction with a productive employee's incentive plan.

A system of time and motion study is presented which makes for closer cooperation between the foundryman and the equipment producer in developing improved machinery. The book tells how to make the most of new equipment and new methods on day-work jobs through work measurement.

Use of time-distance charts for analyzing operations and checking proposed methods is described. These charts, giving a picture of what has to be done, when, and how long it takes, correlate multiple man or machine operations.

Principles of work simplification and forms for their application are presented with emphasis on a follow-up program. One chapter describes the use of motion pictures to study work elements too short for stopwatch reading and to provide a complete record of what took place.

Results of an industry-wide survey on fatigue allowances are summarized and evaluated. In addition, methods of determination fatigue allowances for various foundry operations are presented.

Use of standard costs and how they help prevent running jobs at a loss is covered in another chapter.

Job evaluation and employee rating plans are presented so that the job's worth and a fair day's work can be more accurately determined.

This 8¼ x 11¼-in. case-bound volume was edited by the AFS Industrial Engineering Committee and many chapters were written by committee members. The book is illustrated throughout with over 200 photographs, charts, graphs, and tables. AFS member price is $5.50; non-member, $9.00. Write to American Foundrymen's Society, Book Department, Golf & Wolf Roads, Des Plaines, Ill. Postage will be prepaid if remittance accompanies order.

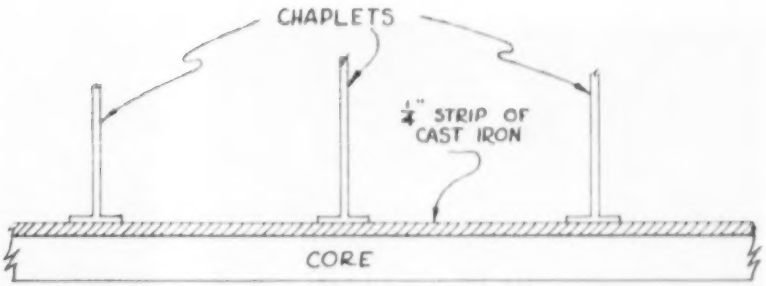
About Cores

AL ROSKOM / *Slinger Molding Foreman*
Zenith Foundry Co., Milwaukee

Practical ideas, developed and proved in foundries and pattern shops, are presented on this page. They may be of any length, preferably short, illustrated by photo or sketch.

Backbone for Long, Thin Cores

■ Long, thin cores are a headache anytime in a foundry, but they call for an extra-large dose of aspirin when they break and float up into the mold cavity during pouring. We make certain machine tool castings that require cores about 50 in. long and about ¾ x 3 in. in cross-section.

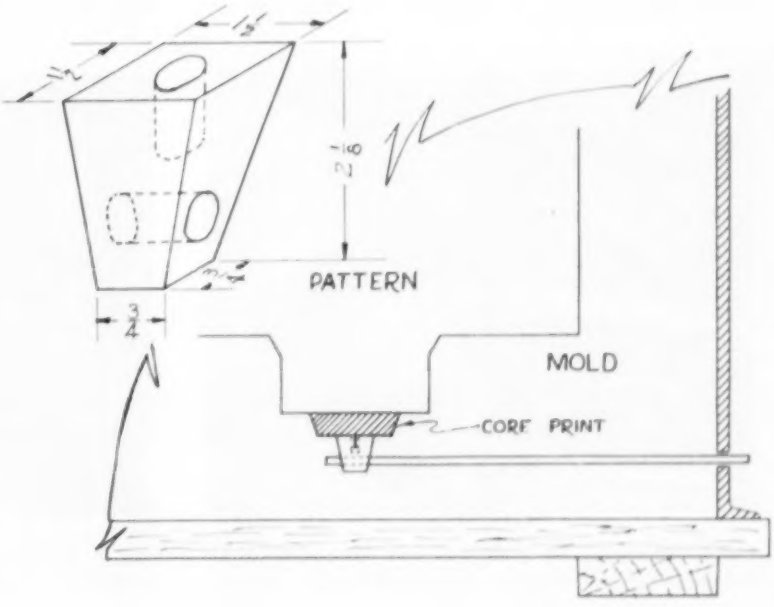


These cores are difficult to rod or reinforce in any way, and won't resist the buoyant effect of molten iron by themselves. Our solution is to cast long ¼-in. strips of iron which can be broken into convenient lengths and used as bearings for the chaplet heads (see sketch). The ¼-in. strip melts into the heavy casting section, which is about 1 x 2½ in., after it has done its work.

Getting Rid of Core Gas

■ Venting large cores adequately can mean the difference between profit and total loss on critical machine tool castings. Here's one way to guarantee that cores in the drag (also cope, if sprues, risers, or runners interfere with simple venting) are vented.

Cast a number of flat-topped pyramids about the size shown in the sketch. In molding, a nail in the core print indicates that one of the little pyramids is to be placed on the pattern. A rod is positioned with one end in the pyramid, the other end out through a hole in the flask. After ramming, the rod is withdrawn and the pyramid removed before setting the core. When the mold is poured, the core gas rushes out through the vent, not through the casting.



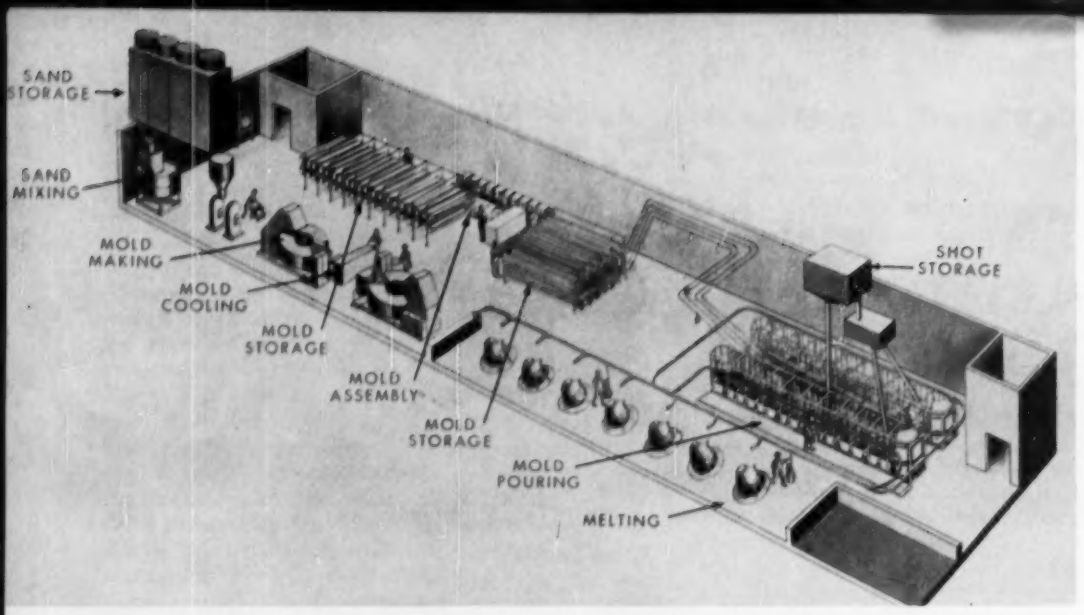


Fig. 1. .Layout of Walworth Company's new mechanized shell mold foundry in South Boston, Mass.

Fig. 2. .Tube supplies sand from overhead storage to mixers. Scale at right is for overhead batch hopper.

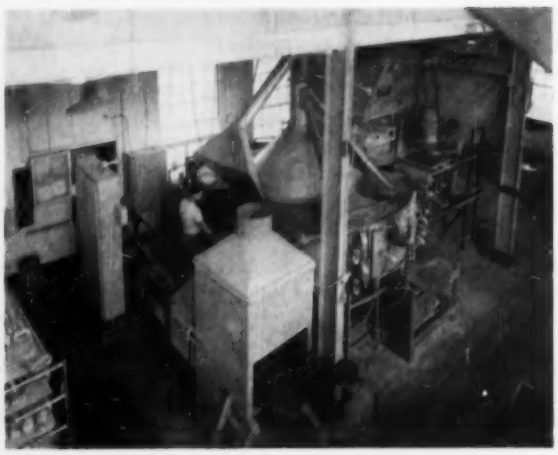


Fig. 3. .Mold-making machine with operator at left. Man at rear supplies new sand mix from mixer bowl.

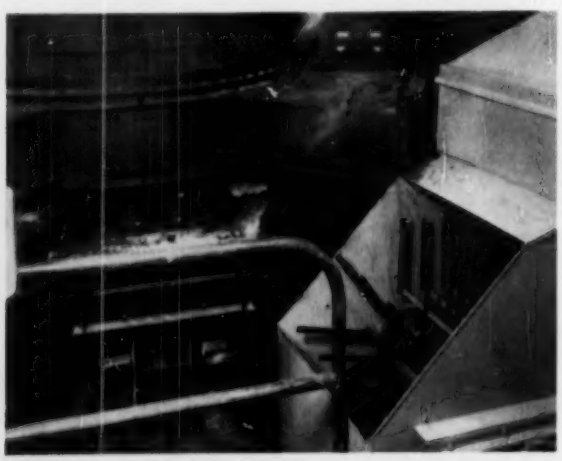


Fig. 4. .Ejection point of eight-spindle molding machine. Transfer conveyor at right cools mold halves.

Fig. 5. .Curing section of molding machine at left, sand supply and investment section at right.

F. Eugene Murphy / *Shell Process Supv.*
Walworth Co., South Boston, Mass.

Mechanized Shell Molding

By nature, the shell molding process lends itself especially well to mechanization. How operations have been mechanizd in his plant was told by the author at the recent New England Regional Foundry Conference.

■ One phase in the evaluation of any process is consideration of the possibility of simplification or mechanization. Shell molding is especially adaptable to mechanizing; certain basic characteristics are highly favorable. The simplicity and fixed formulation of the sand and resin permit easy control by existing methods and equipment. Being composed of a minimum of stable ingredients, it does not require repeated checking or additions. The mechanical actions of investment, dumping, and ejection are unvarying and repetitive and so respond to common engineering principles. Curing, whether by radiance or convection, by gas or electricity, is within the scope of commercial automatic controls.

The regular form, the light weight and rigidity of a shell lend themselves to simple conveyors, racks and other mechanical handling devices. Due to their slight bulk and chemical stability, shells can be stored indefinitely, providing greater flexibility of operations.

The relatively small quantities of material used allow simplification. A large amount of sand-handling equipment and the handling of large volumes of sand are eliminated. Less floor space is required, production is increased and a cleaner foundry, with better working conditions, can be maintained.

These considerations all entered into the mechanization of shell molding at Walworth Co. The present methods and degree of mechanization are the results of a long period of study and experimentation. Changes have been made from the original installation and further changes are contemplated.

Figure 1 shows an artist's conception of the Walworth Bronze Foundry as it is laid out for shell molding. There is practically an in-line flow of materials from the left through mold making, storage, assembly and pouring, with castings delivered at the far right to the cleaning department. Beginning at the upper left-hand corner, washed and dried silica sand flows by gravity from overhead storage bins, through measuring devices, into the sand-mixing machines.

The sand-mixing area is shown in Fig. 2. The pipe hanging between the two machines is a flexible hose through which a weighed quantity of sand can be delivered directly into the mixing bowls of either machine. A pre-weighed amount of resin and a wetting agent are added to the sand in the bowls and the mixture blended on an automatically-controlled time cycle. Made in batches of 300 lb, the mix is transported in the bowls to the mold-making machine. Here, it is charged into a reserve hopper on the side of the machine from which it feeds automatically into the recycling mix.

The mold-making machine (Fig. 3) is completely automatic. Its mechanical actions are hydraulic. The ovens are gas-fired radiants and the entire installation is controlled electrically. It is an eight-spindle machine, each spindle carrying two 14 x 16-in. pattern plates, which may be cope and drag of the same item

Fig. 6. . Mold assembly, core setting, pasting, and closing machine is last stage before pouring machine.

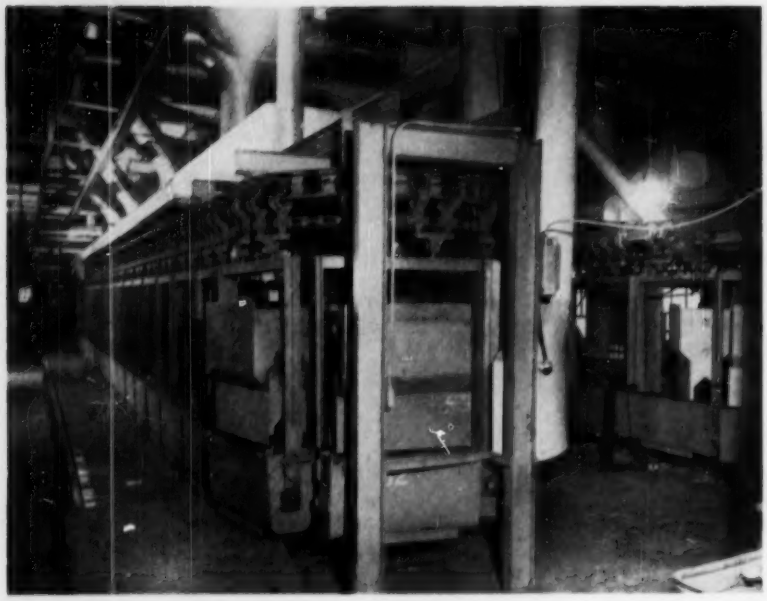


Fig. 7. . Molds are suspended in containers on continuous conveyor loops. Upper containers in foreground discharge shot for back up of shells.

Fig. 8. . At pouring station, moving platform keeps pourer abreast of molds. Monorail ladles hold 200 lb of molten metal, can pour 12 to 16 molds.

or two unrelated items. There is a three-station preheat oven, an investment station, a three-station cure-oven and an ejection station. Indexing is on an automatic time cycle.

The following description of what happens to a single spindle starts after removal of a shell. The spindle starts to move (Fig. 4), the oven doors open, and the passing plate is sprayed automatically with a silicone lubricant. The doors close, and the plate pauses in the first oven station. Since each of the three oven stations has an individual control, a wide choice in heat input is available. The temperatures of the pre-heat ovens are set to compensate for heat loss in the pattern plate during mold making.

At the fourth station, the investment sequence occurs. The spindle is locked in place, a flask lowers and locks onto the pattern plate. A dust boot drops into place, totally enclosing the investment area. The opening of clamshell-type doors in the upper measuring box releases the sand-resin mix, which falls sufficiently far to campact well on the hot pattern plate. The lower doors of the measuring box close and an upper gate opens so that the box is refilled for the next sequence while the dust boot is retracting. After a predetermined dwell-time, which will govern the thickness of the mold, the excess mix is dumped by a 180-degree rollover. After rollback, the flask unlocks, lifts, and the charged plate is indexed into the curing oven. The excess sand slides into the base of the machine where a skip-hoist lifts it to the supply hopper at the top of the machine. A measured amount of fresh mix is added to the recycling mix from the reserve hopper through a synchronized vane feeder.

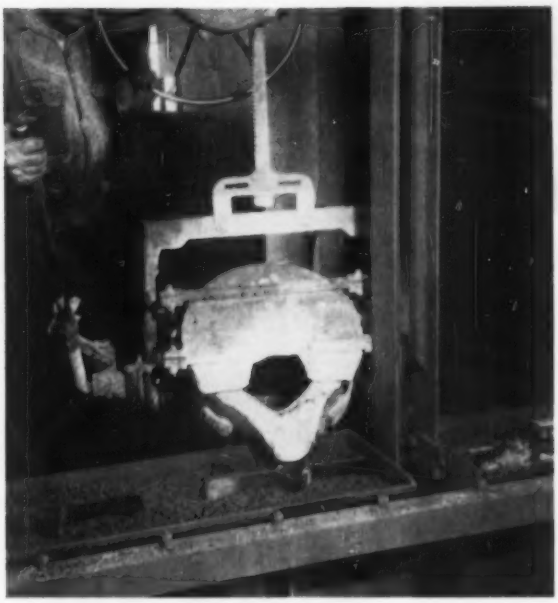
The curing oven like the preheat, has three stations, each with individual heat controls, permitting close adjustment to temperature requirements. A control board, with indicating and regulating instruments and colored relay lights, is at the ejection station, allowing the operator to monitor the various functions of the machine. The cured mold is automatically ejected from the pattern plate and placed manually on a transfer conveyor, for delivery to an automatic storage area.

Figure 5 shows the side of the machine. On the right is the reserve hopper. The accordion-pleated bellows is the retractable dust boot, and immediately above are the measuring box and main supply hopper. The curved section is the curing oven with its exhaust systems. The three individual gas supplies permit flexibility in temperature control.

In the storage area, the molds hang from a rail and are automatically advanced at the demands of assembly. The compact, yet very flexible system allows immediate withdrawal of storage for the accumulation of economically large quantities of a single item. It also acts as a surge area in which any fluctuations of production requirements can be absorbed. Molds are withdrawn on production orders and are started through the assembly area.

The molds are inspected, cleaned, and separated. One half is placed face up on a belt conveyor (Fig. 6) and passes before a man who manually sets the required number and type of cores. Further on, a liquid adhesive is applied to selected areas on the mold as it passes in front of another man, here. Here, again, the system is very flexible. Should the item require the setting of a large number of small or intricate cores, additional temporary help can be fitted in without difficulty. Since the liquid adhesive is extruded onto well-defined areas, change in product does not require time-consuming changes in templates or applicators.

While these operations are proceeding on one half of the mold, the other half, on a synchronized conveyor, has passed through a radiant oven and has been heated. The mating halves, arriving simultaneously at the end of the belt, are matched and locked in the closing machine. This is a series of boxes, mounted on an endless belt, in which uniform pressure is automatically applied over the entire surface of the molds, insuring positive and complete joining. Here, also, a change in shape or contour of the molds can be made without stopping, since the over-all application of



pressure does away with the need for specialized spring frames or templates. Cycling of the machine is automatic, except for loading and unloading, which are manual. The speed of the closing machine is synchronized with the assembly belt.

Completed molds are transferred by an overhead conveyor, either to a storage area or directly to the pouring machines. This storage area acts as a surge area, to absorb fluctuations in production. The pouring machine is essentially a series of steel boxes, suspended from an endless monorail conveyor that forms a complete circuit where all pouring activities are performed.

Molds are removed from the conveyor and manually placed in the steel boxes in a vertical position. Steel fingers hold the mold upright as the machine enters the shot-loading station. A measured amount of steel shot is automatically placed around the mold (Fig. 7). Molten metal is brought from a series of oil-fired melting furnaces on monorail ladles of about 200-lb capacity.

The pourer (Fig. 8) stands on a moving platform, synchronized to the speed of the constantly-moving machine. The length of the pouring machine is such that the castings have cooled below solidification temperature before they reach the dumping station. Shot, casting, and mold are dumped without stopping the machine. Since the boxes are slung off-center on trunnions, the automatic release of a catch allows the box to invert, spilling its contents on a separation grate. The shot is separated and pneumatically moved to a storage tank, where it is cleaned and returned to the shot loading station. This sequence of operations is automatic.

Castings and mold material are transferred automatically to a cooling conveyor, and then to a shake-out conveyor. Clean, core-free castings drop onto a sorting belt in the cleaning department where they are segregated by item and routed to the subsequent operations.

How to Improve Bronze Castings with Chills

ELY PORTMAN/*Vice-President, Stillman White Foundry Co., Inc., Providence, R. I.*

Practical application of chills to production of copper-base alloy castings was outlined by the author during a panel discussion at the recent New England Regional Foundry Conference.

■ Many foundries are reluctant to use chills, feeling that they add to the cost of the castings, and that they are a nuisance. At Stillman White chills are used because they make better castings possible, and because they cut costs by reducing rejections instead of adding to production costs.

Chills are used to obtain directional solidification. Solidification is intended to start at the chills and progress toward the risers which will provide the necessary molten metal to the solidifying castings. Chills are also used on heavy sections adjacent to thin sections to equalize the cooling rate so that solidification can proceed from one thin section, through the chilled area, then through a second thin section, and finally to the riser. Chills are also used in cores at the interface of heavy casting sections that cannot be fed by a riser.

In the author's foundry it has been found that in many cases a chill is an excellent substitute for a riser. Chills can be used under bosses on which a riser would be inconvenient. As equalizers, chills make castings with non-uniform sections more amenable to simple gating and risering practices. A good rule is: If you can't feed it, chill it. Each new job should be studied to determine the proper gating, risering, and chilling. Location of chills can be indicated conveniently by painting chilled areas on patterns and core boxes white.

The shop has several plates with patterns of the various sizes and shapes of chills required. The chills are cast in iron, sand blasted, shellacked, dipped in silica sand, and baked. Prepared chills are sorted according to size and shape and stored on racks in a warm, dry place.

Used chills are again sand blasted, coated, baked, and stored ready for further use. If rust appears on any chills on the racks, they are removed for sand blasting and coating.

Several specific applications of chills at Stillman White include:

Gear blank hubs whose top surfaces are below the rims. Use of a riser would require a great deal of costly hand chipping and grinding.

Castings where risers of necessity must be more than 14 in. apart. Chills are located half way between the risers.

Four-flanged valve body. Gate into each flange, with a riser in front of each gate, and chill each flange at the point farthest from the riser.

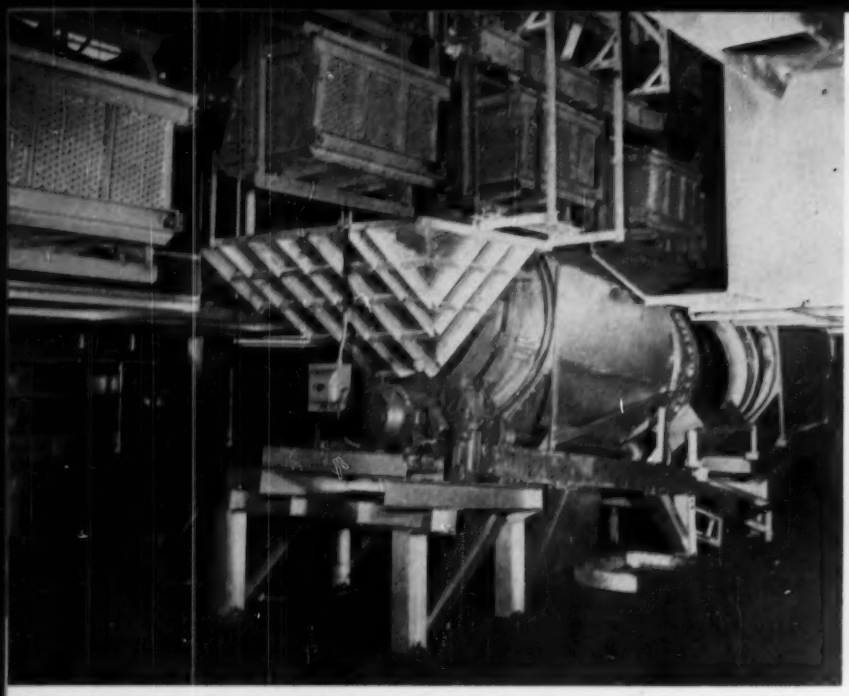


Fig. 1 . . Cooling barrels for small castings.

Cooling Castings After Shake-out

T. J. GLAZA / *Maintenance Supt.*
Crane Co., Chicago

Transportation of hot castings from foundry to cleaning room is a problem that must often be solved in modernizing a plant. The author presented some solutions at the 1954 AFS Convention. His paper is one of 95 appearing in volume 62 of *AFS Transactions*.

■ Transporting hot castings from the foundry to the cleaning room can be done economically by means of conveyors. Length of these conveyors determines the initial installation cost, and the length must be sufficient to deliver castings at a temperature at which the next operation can be performed.

Cooling of castings depends on such variables as size, thickness and type of castings, core in or out, whether castings are to be cooled individually or grouped in baskets or trays, weather conditions, etc To determine results, it is advisable to conduct cooling time tests, which should establish certain factors for engineering design.

Special Gloves Are Needed

Castings at 140 F will burn hands if handled without special gloves or other precautions. If castings are to come in contact with people it is advisable to cool below this temperature, say 130 F.

Various means are used to cool castings, such as air blast, water spray, water immersion, etc. However, these have their limitations, and at times are undesirable, in which case only time can be relied upon for cooling. Use of water to cool, thereby using the latent heat of evaporation, is common. However, there is danger of cracking if the castings are too hot. In one instance a test indicated that a temperature over 500 F with any type of spray would cause cracks in castings; cracks did not occur if the same castings cooled naturally in air.

Generally, an air blast assists in reducing the temperature of the castings at the start of the cooling period. However, it does little when the temperature

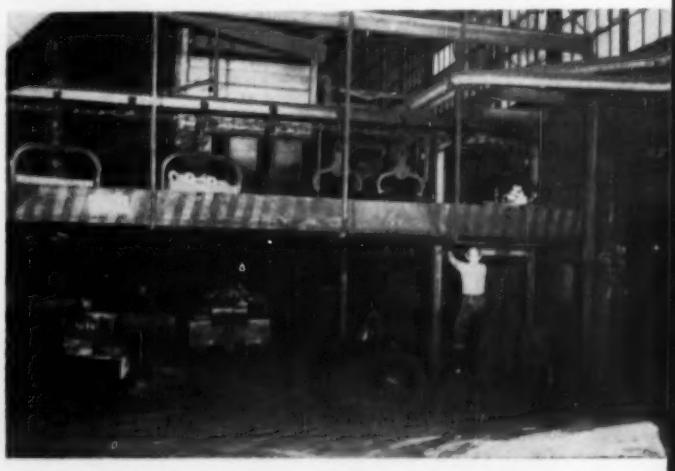


Fig. 2 . . Medium-sized castings are cooled in baskets; larger castings are hung on the "ice tongs."

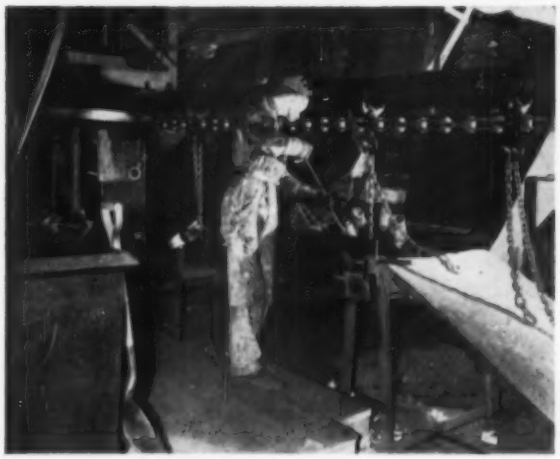


Fig. 3. .Large castings are suspended from conveyor hooks by means of chains.

is considerably reduced. Further, it does little to reduce the heat of castings in a mass, such as castings in baskets, where castings are protected, and heat transfer from the center of the mass is unaffected. Figure 1 shows a system designed to handle small castings. Figure 2 shows medium and large castings being cooled on a conveyor system, the smaller of these castings being placed in a basket, the larger being hung on the conveyor using an "ice tong" arrangement. Similarly, Fig. 3 shows where larger-sized castings are hung on a cooling conveyor using chain, and after being properly cooled are subsequently delivered to a blast room and cut-off floor for annealing purpose. These conveyors were designed to transport the castings to the desired location for the next operation with the least amount of labor to reduce handling costs.

Guide for Conveyor Length Not Found

Some years ago the writer attempted to find some guide to determine the length of a conveyer, based on time, and found no such information available. As a result various tests were conducted on the product concerned. Figure 4 shows the average of several tests on various products, each casting individually air-cooled in still air. It will be noted that castings reach the desired 130 F temperature in 1 to 2 hr. Fig. 5 shows the average of several tests where about 750 lb of eastings similar in nature to those shown in Fig. 4 were cooled in baskets. Three readings were taken, one by pyrometer showing inside temperature, the top casting temperature, and basket temperature. Inside casting temperature did not reach 130 F until 5 hr later, whereas Fig. 4 shows casting reach "handling" temperature within 2 hr if cooled individually.

Figure 6 shows time-temperature curves of various products, generally thin-walled sections at various outside temperatures each hung on a separate hook. Outside temperature did not materially affect cooling rate, nor did the size of product so long as it was fairly uniform in thickness. All castings reached the desired temperature between 1½ and 2 hr after the shake-out operation.

While such charts as shown are helpful, they can be used only as a guide to assist analyzing individual problems and cannot be taken to cover large, heavy, or dissimilar castings. Similar curves should be drawn for these castings, especially if they are to be conveyor cooled as it might prove uneconomical to cool exceptionally large castings. Perhaps the best solution in cooling large castings is to let them cool overnight without special handling.

When modernizing, it is advisable to analyze the product to be handled, conduct tests on specific castings to determine time required to cool for the subsequent operation, and to be governed by handling methods available.

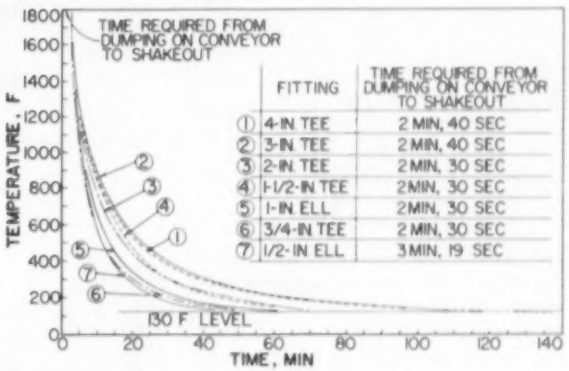

TIME REQUIRED FROM DUMPING ON CONVEYOR TO SHAKEOUT
FITTING
TIME REQUIRED FROM DUMPING ON CONVEYOR TO SHAKEOUT
① 4-IN TEE 2 MIN, 40 SEC
② 3-IN TEE 2 MIN, 40 SEC
③ 2-IN TEE 2 MIN, 30 SEC
④ 1-1/2-IN TEE 2 MIN, 30 SEC
⑤ 1-IN ELL 2 MIN, 30 SEC
⑥ 3/4-IN TEE 2 MIN, 30 SEC
⑦ 1/2-IN ELL 3 MIN, 19 SEC
130 F LEVEL
TEMPERATURE, F
TIME, MIN

Fig. 4. .Cooling curves for single iron pipe fittings cooled in still air.

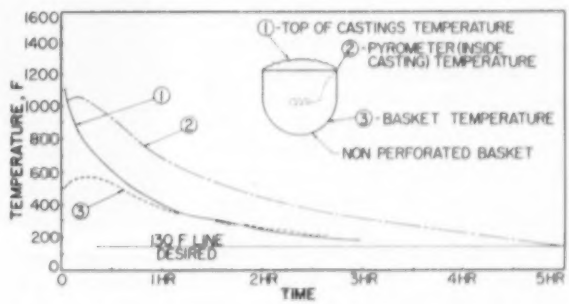


Fig. 5. .Cooling curves for castings in basket.

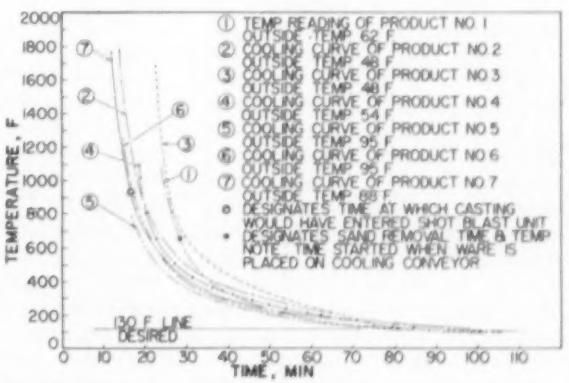

① TEMP READING OF PRODUCT NO 1 OUTSIDE TEMP 62 F
② COOLING CURVE OF PRODUCT NO 2 OUTSIDE TEMP 48 F
③ COOLING CURVE OF PRODUCT NO 3 OUTSIDE TEMP 40 F
④ COOLING CURVE OF PRODUCT NO 4 OUTSIDE TEMP 54 F
⑤ COOLING CURVE OF PRODUCT NO 5 OUTSIDE TEMP 95 F
⑥ COOLING CURVE OF PRODUCT NO 6 OUTSIDE TEMP 95 F
⑦ COOLING CURVE OF PRODUCT NO 7 OUTSIDE TEMP 88 F
o DESIGNATES TIME AT WHICH CASTING WOULD HAVE ENTERED SHOT BLAST UNIT
• DESIGNATES SAND REMOVAL TIME & TEMP NOTE TIME STARTED WHEN WARE IS PLACED ON COOLING CONVEYOR
130 F LINE DESIRED
TEMPERATURE, F
TIME, MIN

Fig. 6 . . Effect of outside air on cooling rate of castings.

HUBERT CHAPPIE / *Foundry Supt.*
National Supply Co., Torrance, Calif.

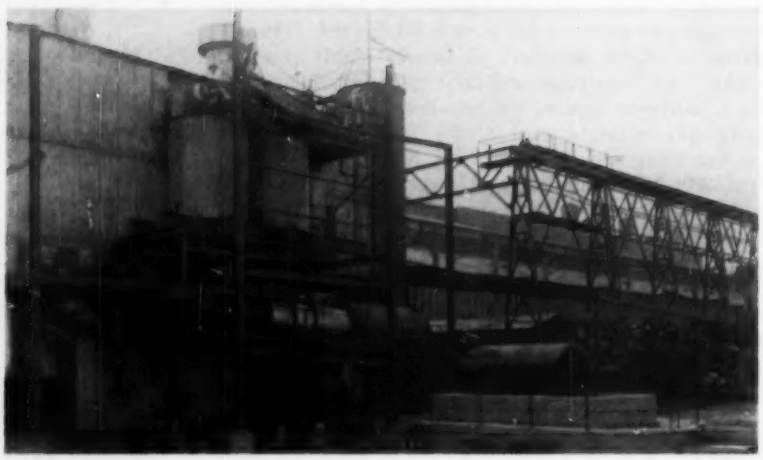
Cut Production Costs
with sand reclamation unit

Two years experience in developing and using new equipment for reclaiming steel molding sand indicates that $40,000 a year would be saved if castings production were 400 tons per month. Cost of equipment was $55,000.

■ Molding sand in the Torrance plant of National Supply Co. comes from a reclaimer unit. New sand (1120 lb per ton of castings) is added to the system by way of cores to make up for handling losses and sand removed in shot blasting and the dust collection system. Since National Supply produces castings weighing as much as 35,000 lb the best obtainable Ottawa silica sand is specified. Average weight per piece is 400 lb.

Installation of a wet sand reclamation system of three tons per hour capacity was completed in 1952. In this process the used sand is fed by a belt conveyor into two sand scrubbers. Water-entrained sand is then pumped to a screw conveyor or classifier to free the sand of water and slime overflow waste. It is fed by the classifier into temporary storage tanks. A belt conveyor under these tanks carries the wet sand to a dryer with a firing unit at its far end. Sand moves from there through a cooling unit and over a vibrating screen conveyor to storage bins.

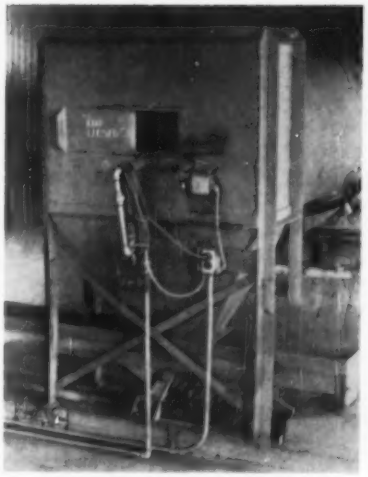
Several changes were made in the equipment and the methods of operation before satisfactory results were obtained. Calcining, which required 1000 F, was abandoned when it was found that the carbonaceous coating on the sand grains exerts little influence upon casting behavior or mold properties of the rebonded, reclaimed sands when used as mold facings. This solved maintenance problems and helped to solve a cooling problem. The temperature of the firing unit was dropped from 1500 to 400 F. Without calcining, the carbon content of the sand has never exceeded 0.11 per cent.



Three tons per hour of molding sand can be reclaimed in equipment at Torrance plant of National Supply Co. It was enclosed after completion.

Further reduction of temperature was provided in the cooler by installation of mist or fog cooling. This equipment consists only of a water pipe with a large number of fine holes. Water introduced in this way does not wet the sand. Another change was replacement of the original rake classifier by a screw conveyor in order to reduce the amount of water carried into the hoppers. Overnight storage in these hoppers also reduces water content to about 10-12 per cent before sand is fed to the dryer.

A filtering unit is now believed to be more satisfactory than the two hoppers for separating the water before heat drying. Although its cost would be $5000 it would also eliminate extra labor which is now required to shovel sand



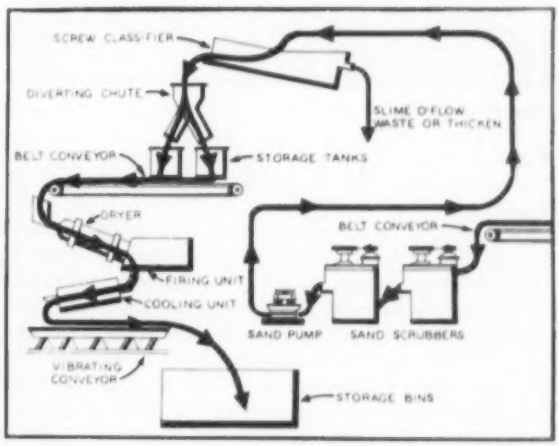
Cooling efficiency was increased by creating fog at discharge end of cooling unit. Vibrating conveyor below takes reclaimed sand to storage.

Table 1. . Similarity in Grain Size of New and Reclaimed Sand

Sieve	New Ottawa Sand*	Reclaimed Sand
20	....	0.08
30	0.04	0.30
40	2.04	5.84
50	32.30	41.08
70	44.90	36.44
100	16.80	13.26
140	2.84	1.63
200	0.20	0.68
270	0.30	0.02
Pan	0.04	0.02
AFS Grain Fineness	51.8	48.7
Clay Content	0.02%	0.05%

*Ottawa No. 1 fine sand specified from 48 to 53 AFS grain fineness

Sand scrubbers receive used sand from belt conveyor, discharge water-entrained sand into pump for delivery to classifier.



Flow diagram of sand reclamation unit shows major pieces of equipment. Sand enters unit on belt conveyor from right.

clinging to the hopper walls when they are emptied.

If another unit were being built the firing unit would be placed at the end of the dryer where the sand enters. This would tend to produce cooler sand. It has been observed also that longer travel time on belts between cooler and storage bin would contribute to cooling sand.

In addition to present satisfactory operation of the reclaiming unit, its installation relieves the purchasing agent of worry over delays of sand shipments caused by bad weather or strikes, and permits a great reduction of the quantity of new sand in storage.

Table 2. . Comparative Molding Sand Costs

	All New Sand	Mixture	
		New	Reclaimed
Sand, per ton	$ 2.85		$1.87
Freight, per ton	11.60		....
Total cost, per ton	14.45	$14.45	1.87
Tons of sand used per ton of casting	1.2	0.56	0.64
Cost of sand per ton of casting	17.34	8.09	1.20
Cost of handling sand per ton of casting	1.63	0.75	....
Total cost of sand per ton of casting	$18.97	8.84	1.20
Total cost of new and reclaimed sand		$10.04	
Savings per ton of castings		8.93	
Savings per year at 400 tons per month		$42,864	

A. E. CARTWRIGHT / *Metallurgist*
Crane Ltd., Montreal, Que.

reflects on

Melting and Pouring Bronze

Never one to follow the crowd, the author comments on some popular ideas in melting and pouring bronze, and passes on some of his experiences in a talk presented at the Northwest Regional Foundry Conference, Vancouver, B. C.

■ Because most brass and bronze is melted in crucible furnaces of one kind or another, my remarks will be most applicable to this form of melting. I go along with the majority opinion and believe in melting with a slightly oxidizing flame as the surest means of minimizing gas absorption by the molten metal. Occasionally a rebel will appear in meeting or in print who will propound a series of logical reasons for the superiority of melting under reducing conditions. He will put forward the claim that a reducing flame will:

1. Give more heats per crucible because of lessened oxidation of the crucible material.
2. Give lower melting losses.
3. Melt in a shorter time.

He will, generally, favor a good flux cover on the metal and/or the inclusion in the metal charge of a fairly active oxidizing addition of copper oxide or manganese dioxide which addition will supposedly protect the charge from absorption of the greater amount of active hydrogen that is generated by burning oil or gas with a reducing flame, and so obtain a melt having a gas content just as low as that obtained by the use of slightly oxidizing conditions. It sounds reasonable.

Why then are these two schools of thought not more evenly divided instead of only the small minority in favor of melting under reducing conditions—especially when we consider that reduction of metals from their ores of oxide, sulphide, etc., by fire is accomplished by using heavily reducing conditions? The fact is, that while some very ingenious theories have been developed, we really know very little that can be proven about the sequence of oxidation and gas absorption by bronzes during the course of melting and superheating.

The use of an oxidizing atmosphere with or without oxidizing additions such as copper oxide or manganese dioxide appears on the whole to give greater safeguard against gas absorption than similar additions used in conjunction with a reducing flame. Unfortunately, it occasionally occurs that when we have apparently provided all of these favorable conditions, we still get a melt with sufficient absorbed gas to give poor density metal and leaky castings.

It has been shown that oxidizing treatments are ineffective to a greater or lesser degree when bronzes contain more than a few hundredths per cent phosphorus or more than a few per cent zinc owing to the powerful deoxidizing qualities of these elements. In other words, the excess oxygen purposely provided will avoid reaction with hydrogen in favor of oxidizing the phosphorus and zinc content of the bronze.

It can be theorized that oxidation of the unmelted surfaces of the charge metal may leave a sufficient excess of oxygen to neutralize the effect of any hydrogen in the atmosphere since only the relatively small surface area of the metal charge can take part in the reaction with the whole oxidizing addition and atmosphere. However, solid metals or alloys so far as I can visualize, can not dissolve hydrogen or any other gas. The detrimental effects of gas absorption by molten metal are only so because the dissolved gas will not stay in solution as the metal solidifies.

When the charge is melted, all of the phosphorus and zinc in the alloy comes into activity so that at this stage where the metal reaches a condition where it is susceptible to gas absorption, the oxidizing materials and atmosphere may be overwhelmed. You can appreciate how nebulous, then, are the principles of melting bronze and how difficult it is to surely assign a cause and cure to the problem of gas absorption. The best we can say at present is that experience has shown that oxidizing atmospheres give a larger proportion of satisfactory melts than do reducing conditions.

The use of fluid covers on crucible melts has been favored as a means of providing a barrier to prevent

hydrogen from coming into contact with the surface of the molten metal. I have found good results with ordinary bottle glass. Two to 5 lb of this gives an adequate thickness of cover but is rather messy and difficult to completely skim off the melt before pouring. To facilitate removing the molten glass cover a small amount of sand, well-dried and free from clay, may be used to thicken the glass. Molding sand should not be used for this purpose because the clay content of the sand will contain occluded water which will possibly help gas the metal during the thickening operation. Care must be exercised to keep the pouring lip of the crucible as free as possible from adhering glass and sand, to which end skimming should be performed from the opposite side of the crucible to that used for pouring.

To actually remove existing hydrogen absorbed by the melt, flushing with an inert gas such as dry nitrogen has been proven effective. Its chief disadvantage lies in the loss of temperature that occurs during violent agitation of the metal for a period of not less than 5 min. This may be made more practical where a covered ladle can be treated through a porous insert in the bottom to which is connected the nitrogen supply. Various proprietary compounds are available for plunging below the surface of molten alloys where they generate by heat an inert gas for displacing hydrogen. A similar effect can be obtained by plunging a phosphorizer containing marble chips which will create an evaluation of carbon dioxide to perform the same function.

The use of charcoal on top of, at the bottom of, or mixed in a crucible charge of metal is not generally favored today, whereas some 20 or 30 years ago it was deemed indispensable. Why? Probably because in those days most bronzes were melted in coke-fired crucible furnaces. When oil and gas began to supersede coke as the popular fuel and the practice of adding charcoal to the charge was continued unchanged, gassy castings undoubtedly appeared with unfailing regularity.

When melting with coke, even with a natural draft, it is well nigh impossible to produce a flame containing a significant amount of active hydrogen. A somewhat reducing flame containing a proportion of carbon monoxide may occur but this does not result in gassing the metal. Oxidation of the charge, on the other hand, was a real problem with coke-fired melting hence the counteracting reducing influence of charcoal in the crucible was necessary. However, charcoal added to gas or oil-fired charges is detrimental since it assists in maintaining an atmosphere in which active hydrogen is readily produced and can be absorbed by the metal.

The only exception that I know of to the detrimental effect of charcoal addition to gas or oil-fired crucible melting of low zinc content alloys is that of melting pure copper for conductivity castings. The addition of charcoal in the bottom of the crucible is helpful for the initial melt-down owing to the readiness of copper to oxide even in an essentially reducing atmosphere. The ease of formation of cuprous oxide is a problem with pure copper that is not encountered with bronzes or brasses because of the preferential

Crucible skim-cover described in text in use for pouring bronze. Travelling cast iron buggy on auxiliary track catches 90 per cent of splash; rod attached to buggy is hooked to far side of shank.

oxidation of the zinc, lead, and tin content of these alloys.

Bronzes most susceptible to hydrogen gas absorption are the phosphor bronzes (gear and bearing bronzes), gun metal, and red brasses containing under 10 per cent zinc for the reasons mentioned previously. As zinc content is increased toward that of yellow brass and manganese bronze (25–40 per cent zinc) the vapor pressure exerted by zinc heated beyond its boiling point provides a barrier to absorption of hydrogen gas. Vapor pressure of zinc does not appear to be effective in preventing gas absorption when the zinc content is under 10 per cent. This is unfortunate since most pressure-tight bronze castings are produced in the gun metal and red brass range. The use of charcoal additions in melting yellow brasses or manganese bronze has nothing either to commend it or condemn it.

In general, charcoal is not recommended for melting silicon or aluminum bronzes though hydrogen absorption is rare with these alloys. While some silicon bronze alloys contain zinc in quantities up to 15 per cent, aluminum bronzes do not usually include zinc in their composition. The probable explanation as to why aluminum and silicon bronzes are not particularly susceptible to gassing by hydrogen absorption is because of the continuous and unbroken film of oxide which is always present on the surface of these alloys and which form a barrier to gas absorption. Active or neutral flux covers are frequently recommended for melting aluminum bronzes but these are for the pur-

pose of minimizing oxidation of the aluminum content rather than to provide a barrier against gas absorption.

While we are on the subject of melting, let us take a little closer look at one or two of the theories that have become accepted as facts mainly because of frequent and widespread repetition. It is said, for example, that it is absolutely essential that your metal charge must be free from surface moisture or oil because of the danger of gassing the metal during melting. Furthermore, if charcoal is to be used in the charge, it must be thoroughly pre-heated to eliminate moisture before going into the crucible.

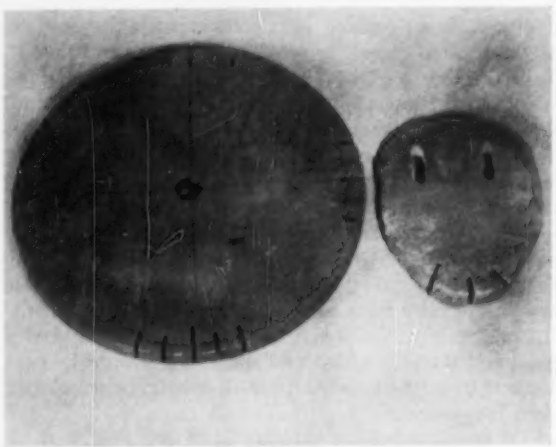
There is no good reason or excuse for using soaking wet charges, yet the presence of some moisture on ingot or sprue going into a cold charge is not a matter for great concern. I have even seen special heating provisions made in foundries for the sole purpose of drying condensed moisture from ingot and sprue at appreciable cost in fuel and handling. Since metals or alloys do not absorb gas while in the solid state, then long before melting commences all water or oil will have been volatilized and have disappeared from the furnace atmosphere; I have proven this conclusively to my satisfaction.

Damp or Oily Chips are the Exception

I will make an exception here and say that this does not apply safely where damp or oily chips form part of the charge. These should be dry and free from oil or grease owing to their tendency to agglomerate and insulate themselves up to a late stage in the melting process. I shall refer later to the practice of utilizing chips in the charge and describe a successful procedure for doing this. Granted that it is bad, because dangerous, practice to add damp ingot or sprue to a partly melted charge, you still cannot cause bronzes to absorb hydrogen in significant quantity until the melting point of the whole charge in the crucible has been exceeded.

Incidentally, Baker of the British Non-Ferrous Metal Research Association, in a paper on porosity control of bronze castings which appears in the December 1947 issue of AMERICAN FOUNDRYMAN says: ". . . with the gas-fired and coke-fired furnaces used in the Association's laboratory, it has long been the experience that bronze melts are much less readily gassed than might be expected. In most of the work on degassing methods, the bronze melts were deliberately gassed by treatment with hydrogen before applying oxidizing treatments."

Closely paralleling the bug-a-boo of damp charges is the fetish condemning piling up a crucible above its brim with charge metal or preheating ingot or sprue on top of the furnace in the flame. I, myself, have in the past been guilty through lecture and reading indoctrination of warning against "barbecuing" in this manner the sprue or ingot with the vague impression that either serious oxidation of the metal surface would result or that the metal would be given some mysterious added ability to absorb and retain harmful gases. Granted that a certain amount of oxidation of the surface will occur, the possibility of promoting gassing of the metal by such treatment



Graphite skimmers for crucible (left) and ladle.

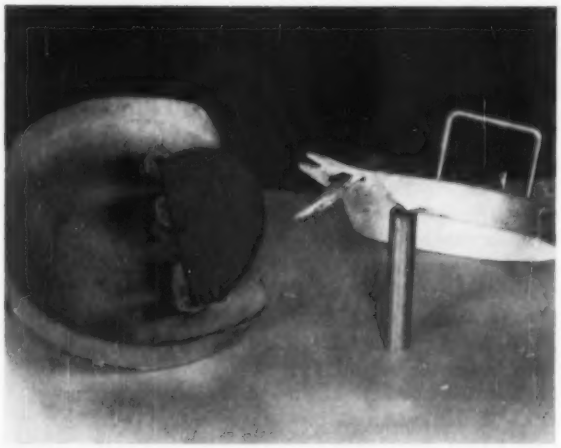
appears fantastic when examined in the cold light of reason. Open-flame furnace melting, in which the whole charge is subjected to preheating in the direct flame is well established as producing satisfactory gas-free metal when properly practiced; its chief draw-back being that of slightly greater oxidation losses than with crucible melting.

I don't want to create the impression that I favor careless and sloppy melting practice. I believe that care and close supervision of all phases of furnace practice is absolutely essential to get the best results. For example, take the use of oxidizing and reducing flames. Many people will say, "Oh yes, we are melting with a slightly oxidizing flame," without actually checking that this is so. The well known zinc test (passing a strip of slab zinc through the flame and observing the condition of the surface) is easy to perform, but many will blithely pay lip service to the importance of a slightly oxidizing condition without troubling to establish whether they actually have it.

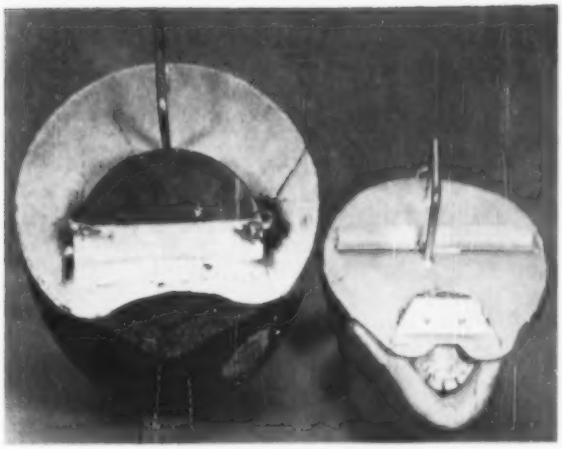
But this is not all. It is never pointed out in recommendations to utilize the zinc test that the condition of the flame may change with the same burner setting during the course of melting and superheating. A zinc test made soon after starting a cold furnace, or one that has been cooling standing open then having a full cold metal charge inserted, may show an oxidizing flame as then adjusted. However, when the furnace and charge have reached the temperature at which superheating will commence, conditions may have changed or have even reversed so that at this important stage *it* is much more essential to apply the zinc test.

So I want to suggest that we think more carefully about how and why we do things and concentrate our effort where it will do the most good. The foundry has ever been a hot bed of superstition and many speakers on foundry subjects have unconsciously maintained and even added to prevalent superstition rather than helped eliminate them. We may be (and I know I have been) prone to accept without too much examination decrees and statements on foundry subjects merely because they have been proclaimed and repeated so often.

Many foundries have available bronze and brass



Worm's-eye view of covers with graphite skimmers.



Skim-covers as used with crucible and ladle.

chips well segregated as to composition by careful handling through their own machine shop or from a reliable outside source. Some do not care to include such material in a charge, preferring to sell it to a scrap dealer or smelter at about half or less its value in terms of solid metal. It is pointed out that, owing to their immense surface area chips tend to oxidize severely during melting, giving heavy oxide dross accumulations. Melting losses are said to be high, melting slow and the metal as a whole is likely to carry entrained some of the oxides so produced into the molds.

We have found by careful trial and measurement that a charge of brass or bronze which includes 12 per cent to 15 per cent chips gives only about ½ per cent greater melting loss, requires less than 5 per cent longer melting time, and pours just as clean and sound castings as metal charges from which chips are excluded. This represents definite economy.

In charging chips we obtain very good results by placing all the chips in the bottom of the crucible where they form a cushion to receive the heavy ingot and sprue portion of the charge. As melting progresses, the sprue and ingot begin to melt and trickle down, the chips are floated gradually and they melt progressively, though slower, along with the solid portion of the charge. By the time all ingot and sprue are melted most of the chips have also melted except for probably about 5 per cent. This last to melt admittedly does burn quite severely, giving a rather more voluminous dross to skim than is the case with chip-free charges. Our less than ½ per cent greater melting loss on the charge as a whole would represent probably something under 5 per cent of the actual weight of chips charged.

While I have discussed somewhat the pros and cons of melting conditions and their relation to excessive gas absorption by the metal being melted, these remarks have been directed toward the generally desirable aim of preventing the occurrence of gas pick-up. Much less has been said and written about the embarrassment and puzzlement resulting from producing melts of metal having an abnormally low gas content. While we can seldom, if ever, produce with normal foundry melting equipment, a bronze that is substantially free from gas, there are infinite degrees of gassing of molten alloys that can result (particularly with castings that must be pressure-tight) in varying percentages of rejections.

When we produce a melt abnormally low in gas content, we run into shrinkage problems that do not occur with metal having the higher gas content that gave sound castings with a given gating, feeding, and pouring practice. A surface shrink, for example, may appear suddenly on a poorly fed internal section such as the seat of a valve body. It may look very similar to a blow and will often generate an energetic argument between the foundry foreman and the core room foreman as to whether it is a shrink or a blow. This can be especially interesting as both conditions may frequently occur and are not readily distinguishable one from the other.

When metal with an abnormally low gas content is the actual cause, the hole has been produced by a localized external shrinkage being unhampered by an opposite pressure of gas being rejected as the metal freezes. Quite as frequently the phenomenon may show up as overall or localized intergranular shrinkage porosity. The type and degree of shrinkage is dependent on several factors, chiefly pouring temperature, gating, and feeding design.

A number of years ago the problem of having runs of high shrinkage red brass melts was a source of argument between myself as metallurgist and the foundry superintendent, who was and is a highly intelligent practical and expert foundryman. A sudden spate of leaky castings and many containing external evidences of shrinkage would occur from time to time with molding and gating practice that would normally give perfectly satisfactory castings. I would be on the spot as responsible for melting practice and, frankly, at a loss to know what to do about it.

My friend the superintendent, being a very nimble witted and resourceful individual unencumbered by metallurgical reasoning, came up with the opinion that the metal was being excessively oxidized and contained entrained oxides which caused the shrinkage. This outraged my sense of logic since there were

none of the usual evidences of oxidation, but since he persisted in his argument and I couldn't think of any reasonable solution to counter it, I went to work with fluxes (which were not at that time being used in our practice). The results were just as bad or even worse in terms of shrinkage.

Did this convince my friend? No. He persisted and insisted that dissolved oxides must be the answer and that my fluxing efforts were not equal to the job. He said, "How about doubling up on the phosphor copper addition for more complete de-oxidizing?" We were using about 3 oz per 100 lb of brass at the time. I thought, and maybe I said, this was absurd, but I nevertheless doubled the addition and to my surprise there was a marked reduction in scrap. "Well, let's make it 8 oz" he said. We did, and obtained 100 per cent good castings.

Now this kind of thing is not good for a metallurgist's morale. There was no apparent basis for such results and, after a time it is true that we did get into trouble with high phosphorus and cut it back to the normal 3 oz. However, occasionally the high shrinkage metal would reappear and then increased phosphorus addition would be a reliable remedy.

In those days we didn't know about metal-mold gas reactions. I think it was about 1946 or 1947 that the British Non-Ferrous Metal Research Association first brought this phenomenon to light and explained it. Anyway, there was a paper by W. A. Baker in the December 1947 issue of our AMERICAN FOUNDRYMAN that is the first reference to it that I know of. There also appeared in the British *Foundry Trade Journal* issue of December 27, 1951, a paper by Buckley and Mantle covering practical foundry tests with production patterns based on the findings of the research to which I have referred.

Not A Really New Idea

While it cannot, therefore, be called a really new idea and has become fairly widely known, there may be some here who may have overlooked this phenomenon, perhaps through not having run into the problems of unusual shrinkage in gun metals and red brasses. It may be interesting to quote a little from the Buckley-Mantle article:

"Work carried out at the laboratories of the B.N.F.M.R.A. has shown that not only can gun metals and phosphor bronzes absorb gas during melting, but gas is also absorbed after the metal has been poured into the mold. This is because of a reaction which goes on between the molten metal and the steam generated from the sand. Even with dry-sand molds or core sands there is ample steam evolved for the reaction to take place. Through this reaction, gas can be picked up by the metal all the time it is freezing in the mold.

"Laboratory tests have indicated that gas absorbed in this way helps to bring about a more even distribution of the shrinkage unsoundness in castings and is much more effective in preventing leaky castings than is gas absorbed during melting. In the test casting used in the laboratory, for instance, the localized unsoundness which led to leakage under pressure could be avoided by making use of this reaction and it seemed that this should provide a useful tool for helping the practical foundryman to make pressure-tight castings in cases of difficulty.

"The extent of this reaction, which might be termed 'metal-mold reaction' depends mainly on two factors: (a) the pouring temperature, and (b) the phosphorus content of the alloy.

"With leaded or lead-free gun metals, the reaction is slight when the phosphorus content is 0.02 per cent or less, except when the pouring temperature is very high, so that with the amount of phosphorus usually added for deoxidation of these alloys the amount of gas absorbed by the metal in the mold is negligible."

You can appreciate then that my friend, the foundry superintendent, had hit upon the right answer, to my embarrassment, through entirely mistaken reasoning. To visualize the role of phosphorus as exclusively deoxidizing is, therefore, a mistake; it may well be performing on occasion a function of improving casting results by an altogether different process.

Referring back to the quotation, I would like to point out that a certain ambiguity exists in it. It is first implied by the author that the reaction depends on a *combination* of two factors—pouring temperature and phosphorus content. However, he then implies that the reaction is produced by either *alternative* of these factors. Let us think about this for a few minutes.

Effects of Increasing Pouring Temperature

If we are faced with leakage in our castings due to this cause and we increase pouring temperature to attempt to overcome the trouble, we run into these effects and implications:

1. We increase superheating temperature to provide that greater margin and thereby possibly increase the gas content of the bronze. Then the question is—do we increase gas reaction by the increased pouring temperature or has the gas absorbed during superheating accomplished the desired effect?

2. If we suppose that it is possible to superheat bronze to a sufficient margin for the selected higher pouring temperature without further increase of absorbed gas, we are still faced with uncertainty as to the mechanism of the end result, good or bad.

It is well known that the higher the pouring temperature of most alloys (tin bronzes included) the larger the grain size in the casting. The larger the grain size, the shorter and fewer are the grain boundaries and, therefore, the easier it is to completely close the interstices between them with the last-freezing components of the alloy. So we are again faced with uncertainty in connection with increased pouring temperature as to whether increased metal-mold reaction has contributed most to soundness or whether intergranular shrinkage has been lessened by reduction in capacity of the grain boundaries.

In this connection, I may say that it has been my experience that it is preferable to sacrifice somewhat the maximum physical properties obtainable from lower pouring temperature and accompanying small grain size in favor of the more certain pressure tightness obtainable with moderately higher pouring temperature and larger grain size. In appraising the information quoted relative to metal-mold reaction it is advisable, therefore, not to consider wide ranges

of pouring temperature but to consider the one factor only, phosphorus level. It is then readily established by varying the phosphorus content that the desirable effects of this are indeed produced.

Next, I am going to ask you to consider with me the matter of pouring of melted and superheated bronze into molds. This important procedure is often neglected or glossed over in discussions of bronze foundry practice, giving way to the supposedly more important requisites of melting, sand practice, molding, and gating practice.

I am going to suggest to you that extreme precautions in melting, sand, and molding practice can be nullified by insufficient attention to pouring procedure. The prime necessity in this part of the process is, of course, to get clean metal at the correct temperature into the mold with minimum agitation and damage to the sand surfaces of the gating system and mold cavity. Some rather questionable methods, in my opinion, of attaining this end are widely practiced.

Methods Are Generally Similar

Methods of skimming off dross at the furnace, and as the crucible or ladle is tilted to pour, are generally similar in most foundries but the effectiveness of skimming may vary widely. Where a single pouring man operates a crucible held in tongs for pouring, he can, if expert, skim and hold back surface dross with a skimmer held in one hand and use the other for tilting the crucible and so pouring his molds. For larger ladles and crucibles requiring setting the crucible or ladle in a pouring shank, two or three men are usually required, one to tilt the ladle, one to steady and adjust pouring height with chain block or electric hoist, and one man to stand opposite and skim with a hand skimmer.

A minimum of pouring labor is desired so frequently one man operates a side-handle pouring shank and trusts either in a thorough preliminary skimming, in a so-called floating skimmer, or in dams and chokes in the pouring basin or runner system, or in some combination of these. Sometimes a tea-pot spout ladle is used to facilitate pouring clean metal. At Crane Ltd. we have given a lot of thought and experimental effort to effective skimming and pouring method and have found each of the above alternatives to be at most only partly effective and heavily dependent on the human factor.

Recently an answer to this and other problems connected with pouring has been found mainly through the ingenuity of our brass foundry foreman, Leon Gadoury, whose design for a combination cover and skimming device has been operating with outstanding success for the past several months. A patent has been applied for covering this device.

It is quite simple in construction and operation as can be seen from the illustrations. The cover is fabricated by welding 1/8-in. steel sheet to which is welded a manual lifting handle made of 1/2-in. steel rod. A slot with a steel angle fixture near the pouring front of the cover allows inserting and adjusting a skimmer of a refractory material. This may conveniently be a so-called floating skimmer disc for circular-sided crucibles or shaped skimmer cut from a discarded crucible to match the contour of a lipped ladle. In our practice we operate both tilting and stationary crucible furnaces, pouring ladles being used to tap from the tilting furnaces while the melting crucible is used to pour in the case of the lift-out type furnaces.

The skimmer discs or shapes are slotted with a hack-saw blade to give approximately 1/16-in. slots which allow the molten metal to pass but hold back all but the finest particles of dross. They are adjusted after each pour so that there is little more than the equivalent of a slot width between the edge of the skimmer and the inside wall of the crucible or ladle spout. In the case of the circular graphite skimmer, this is slotted at 90 degrees around its circumference and as one section burns away it can be rotated to a new position. One of these discs will allow pouring of about 25 crucibles of 500-lb heats from each of the four positions so that one disc is good for pouring 50,000 lb of bronze.

The advantages of this combination device result from the quadruple conditions of:

1. Skimming and filtering out dirt and oxide drosses which might otherwise enter the mold with the metal being poured.

2. Reducing loss of metal temperature during the pouring of molds, thereby allowing use of a lower degree of superheating of the molten metal with consequent lessened risk of gas contamination, and providing a lessened difference in pouring temperature between that of the first mold and the last when pouring a series of molds.

3. Reducing the formation of oxide dross during pouring of molds by reduced contact of the molten surface with exterior air currents.

4. Reducing markedly the release of heat and fumes of lead, zinc, etc., to the foundry atmosphere and thereby improving conditions of health and comfort to the benefit of foundry personnel.

Tend to Follow Questionable Methods

I referred earlier to what I considered some rather questionable methods of assuring the pouring of clean metal into molds. One of these I would like to dwell upon a little because it is an example of how we tend to follow slavishly a widely recommended misconception based mainly on the loose use of a word. I refer to the strainer core. Here's a quotation from a modern book on non-ferrous foundry practice, selected merely becuase it is typical of the current definition:

STRAINER CORES AND CHOKE GATES: "The most commonly used is the strainer core made in oil sand situated either at the bottom of a runner cup or at the bottom of the down-gate—this latter method is extremely satisfactory for machine-molded castings. These strainer cores vary in size according to the size of casting or castings, and their name is self-explanatory, i.e., straining or cleansing the metal and preventing the entry of slag into the mold, at the same time controlling pouring speed."

This is another case where one should think a little more carefully of actualities rather than be guided by the misleading use of a graphic word. The word strainer is definitely a misnomer. Take, for example, the use of this strainer at the bottom of a 1 or 1 1/4-in. down sprue. It will contain several holes anywhere from 1/8 to 1/4 in. in diameter. For straining purposes,

this approximates a kitchen colander. Dross of a size that can be strained out by this type of strainer should not be allowed to enter the sprue! It can not possibly float upward after reaching the strainer core owing to the opposing downward flow of the entering metal. If the holes of the strainer core do prevent dross of such size from passing it must necessarily plug the holes. How then, is metal to pass the strainer and fill the mold?

The author commences his next paragraph with: "Figure so and so shows these two types of *choke gates.*" Now he uses the correct functional word but he has, unfortunately, already emphasized the misleading meaning attached to the much more commonly used term *strainer core.* If you are sold on the idea of using a choke core at the base of a down sprue, you might better use a core like a doughnut having one central hole of such diameter as will provide the degree of choking that you fancy. I doubt, however, that the base of the down sprue is the best location at which to control metal flow since it is apt to prevent the runner from being properly filled and fulfilling one of its logical functions, that of a dross and dirt trap. Choking within the mold, I believe, is most effective between the runner and ingates.

Check Internal Choke Cores

If, you still fancy the use of internal choke cores with multiple holes, do please check that they themselves are not generating dirt to enter the mold cavities. A weak oil-sand core that will break down and wash along with the entering metal is a poor reward for meticulous melting and molding practice. Do look freqently and critically at a carefully shaken-out gate of castings for evidence of core breakdown and, after breaking out the choke core itself, to see that the columns frozen in the strainer holes are smooth and free from evidence of burn-out.

Use of a choke core in the pouring cup for small molds has, I believe, very little to recommend it since it will not there function as a strainer; neither will it act even as a skimmer unless used in conjunction with a sizeable pouring basin. For larger molds filled by direct pouring through a feeding head-gate, a perforated choke core is indispensable to maintain a full pouring basin and so allow slag time to float to the top of the metal in the basin as well as to control the flow and impact of metal entering the mold. It must not, however, be allowed to function as a strainer which will only occur if the pouring basin is allowed to empty before the mold is completely filled.

Other questionable methods of getting clean metal into the mold include the wrong use and design of single entry horn gates and a mistaken impression as to the danger of using multiple ingates for dross-forming alloys such as manganese and aluminum bronzes.

The horn gate is widely favored for bottom pouring of aluminum-containing bronzes as supposedly providing a non-turbulent entry of the metal into the mold. This is only the case where certain definite precautions in design of the horn gating system are taken. First, the horn gate itself should be tapered, the larger end entering the casting cavity. This principle is widely agreed upon. Secondly, the down sprue should not enter in direct line the horn section of the gate. The down sprue should continue past a horizontal trap to an enlarged roughly spherical well which is sometimes called a turbulence cushion. Its function is to absorb the velocity and impact of the downcoming metal, so that as the metal enters the horizontal trap it is quiet and enters the small end of the horn gate without turbulence. As the horn gate increases in size toward the casting, the flow is further modified to a quiet entry.

Unless such precaution is used in the design of a horn gate the fountain effect provided by a direct horn gate generates more oxide dross than would a simple side-entry bottom gate.

The use of multiple ingates for manganese and aluminum bronze castings of such shape as cannot conveniently be poured through a horn gate is frequently condemned on the ground that an oxide film formed on the metal will prevent two or more streams from joining homogeneously where they meet. This can only be true when the metal is poured at a temperature low enough to provide a cold shut anyhow. Multiple ingates with proper sprue and runner design and with metal at adequate pouring temperature will give sound castings free from oxide inclusions and will be much safer from a feeding standpoint than a single gate with a hot spot located near the ingate.

Some statements made in our literature and at meetings will not always stand up to close scrutiny. I remember, to give one example, an eminent foundry expert proving to a gathering that feeding by pressure from a high pouring sprue was an illusion. To demonstrate this he poured two keel test blocks, one with a sprue an inch or so higher than the block itself, the other with a sprue built up to about 6 ft in height. The fact that there was an equal shrink in both blocks was postulated by the speaker as proof that no feed by pressure was obtainable from the high sprue.

Little Heating of Sand Surface Possible

When one thinks carefully about this assumption, one realizes that it only holds true in relation to the amount of metal poured. The keel blocks required only 25 to 30 lb of bronze to pour and therefore little heating of the sand surface of the sprues was possible to aid in keeping a 1-in. diameter sprue liquid. Quite a different effect is obtained in pouring a 200 or 300 lb casting through a 1-in. sprue. The sand walls of the sprue are highly heated by the passage of so much metal and consequently, the metal remaining in the sprue at the end of pouring is liquid and effective as feed metal—especially if it is high enough to exert pressure. Many tin bronze and gray iron castings can be fed solid without the aid of risers by such hot-wall pressure feeding. This does not hold true for short freezing range alloys such as manganese and aluminum bronze, steel, malleable iron, etc. But don't necessarily take my word for it.

I have tried to present a few angles on melting and pouring bronze. The possibility that readers may disagree with me on any and all points is of minor importance provided I have put over the idea that it is essential to *think* more about what we do in the foundry.

VICTOR M. ROWELL / *Foundry Products Div. Archer-Daniels-Midland Co., Cleveland*

What High-Temperature Tests Tell

About Core Knockout

Hot compressive strength and retained compressive strength tests of core specimens heated in their own atmosphere indicate relative difficulty of core knockout according to this résumé of a report by the AFS Committee on Physical Properties of Iron Foundry Molding Materials at Elevated Temperatures. The author is a member of the committee.

■ The problem of selecting or devising a laboratory test which will predict the difficulty likely to be encountered in removing cores during casting shake-out seemed most likely to be solved by a comparison between foundry tests and laboratory tests. Accordingly, Committee 8-J devised a hollow cylindrical test casting to be molded in green sand and cored by a dry sand core. The test castings were 7¾ in. long and 7½ in. in diameter with concentric holes in upper and lower ends 3¼ in. diameter and 5 in. diameter, respectively. Two patterns were available so that castings of ¼-in. metal section weighing approximately 20 lb and ½-in. metal section weighing approximately 38 lb could be produced ["Evaluation of Core Knockout," TRANS. AFS, vol. 55, pp. 313-325 (1947)].

In addition to pouring castings of two wall thicknesses, the committee simulated floor type foundry practice and mechanized foundry practice. This was done for floor practice by allowing the molds to stand two hours after pouring before removing the castings. The cores were knocked out 5½ hrs after pouring. To simulate mechanized practice the castings were removed from the mold one-half hour after pouring and the cores were knocked out immediately thereafter.

This light weight cylindrical casting was selected for uniformity of heat input to the test core and ease of observation when the core was completely removed from the casting. The committee selected five core mixtures which would be representative of iron foundry practice from light to heavy castings and would also give a wide range of core knockout difficulty. The

Noting sand removal rate during core knockout study.

core mixtures employed many of the core binders commonly used in iron foundries.

The five core mixtures, prepared in a 36-in. muller-type mixer, had the following composition (all percentages by weight):

No. 1. 99 per cent Lake Michigan dune sand of 55.4 average fineness was mixed with 1 per cent linseed-base core oil for 4 min; 3.6 per cent water was added, and mixing continued for 6 min.

No. 2. 70 per cent Lake Michigan dune sand, 28.25 per cent Michigan bank sand (average fineness 89.1) and 0.5 per cent cereal binder were mixed 2 min; 4.1 per cent water was added and mixing continued for 4 min; 1.25 per cent linseed-base core oil was added and mixing continued for another 4 min.

No. 3. 87 per cent Lake Michigan dune sand, 10 per

cent silica flour, 0.5 per cent western bentonite and 1 per cent cereal binder were mixed 2 min; 5.5 per cent water was added and mixing continued for 4 min; 1.5 per cent linseed-base core oil was added and mixing continued for 4 min.

No. 4. 49 per cent New Jersey gravel (average fineness 19.5, clay 17.4 per cent), 49 per cent heap sand (average fineness 71.7, clay 14.1 per cent), and 2 per cent pitch were mixed 2 min; 7.5 per cent water was added and mixing continued 6 min.

No. 5. 15 per cent Lake Michigan dune sand, 81.5 per cent heap sand, 0.5 per cent cereal binder, and 3 per cent rosin-type binder were mixed 2 min; 8.5 per cent water was added and mixing continued 6 min.

At least 24 cores were carefully and uniformly made from each mixture. Ramming was accomplished by jolting each core 25 times on a small molding machine with an 18.5 lb ramming weight on top of the sand. Each core was vented with a ⅛-in. diameter rod and drawn with the aid of an air vibrator. Cores were placed in a hot core oven within one hour after ramming. Mixtures 1, 2, 3, and 4 were baked for 5 hr at 425F in a gas-fired oven equipped with automatic temperature control and mechanical ventilation. Cores made with Mixture 5 were baked at 400 F for 4 hr. All cores were allowed to cool at least 12 hr before setting in molds.

Test Specimens Were Made

Laboratory test specimens were made from the sand mixtures and stored in covered 5-gal containers within 2 hr after mixing. Sufficient specimens for room temperature tests were formed along with 1500 double-end rammed 1⅛ x 2 in. specimens from each mixture for elevated temperature testing. Test specimens were baked at the same temperatures employed for the cores but for a time of 3 hr. Complete data on all five core mixtures and 100 castings is included in TRANSACTIONS but in this review only the more significant averages will be listed (Tables 1, 2, and 3).

In the interests of uniform conditions, green molding sand was tempered to optimum moisture content and riddled. Care was given to the molding operation so no unforeseen variable would enter the picture from this source. Gray iron of analysis to produce a rather soft iron was melted in an electric furnace and pouring temperature was carefully maintained at 2650 F for each of the 100 castings produced. Pouring time for the ¼-in. section castings ranged from 5 to 7 sec. Pouring time for the ½-in. section castings averaged approximately 12 sec.

At the proper shake-out time for the castings produced under simulated floor type foundry practice, the castings were carefully removed from the molds and placed in a horizontal position until time for the cores to be removed. At the proper times, castings were positioned on a mechanical shake-out device, of a design used in many foundries, and held in place by a fixture while the time required for core knockout was determined with a stop watch. Castings were put on the shake-out in a vertical position with the larger opening down, and the number of castings on the machine was always constant.

The order of increasing core knockout difficulty was

Table 1. . Room Temperature Properties of Core Mixtures

Core Mixtures in Order of Increasing Knockout Effort Required	Moisture, %, Sand as Mixed	Baked Permeability	Baked Tensile Strength, psi	Baked Compressive Strength, psi
1	3.75	252.5	113.0	321
2	4.00	163.0	181.0	644
5	8.35	61.5	25.2	153
3	5.35	85.0	186.0	680
4	8.8	39.2	18.0	280

Table 2. . Elevated Temperature Properties of Core Mixtures

	Collapsibility Time in sec., 90 psi Load		Hot Compressive Strength, psi 12 min Heating Time				Gas Pressure, in. Water
Atmosphere	Own	Air	Own	Own	Own	Air	Own
Temperature, F	1500	1500	800	2000	2500	2500	2500
Mix No. 1	58	30	50	9	3	0	3.8
Mix No. 2	85	33	60	23	5	4	4.2
Mix No. 5	18	4.1	36	33	55	3	26.
Mix No. 3	121	43.7	198	91	78	9	5.7
Mix No. 4	215	474	116	230	250	9	50+

Table 3. . Retained Compressive Strength (psi) of Core Mixtures

Heating Time, min.	8	12	12	20	30	10	30	30
Atmosphere	Air	Own	Air	Own	Own	Own	Own	Air
Fce. Temp., F	800	800	800	800	800	1000	800	800
Test Temp., F	Room	Room	Room	Room	Room	Room	300	Room
Mix No. 1	23.8	31.9	0	28.7	26.9	8.0	25.3	0
Mix No. 2	102.1	74.4	23.0	73.8	70.1	11.6	61.4	0
Mix No. 5	188.4	118.4	144.5	113.4	143.3	116.2	129.1	62.2
Mix No. 3	293.1	254.5	187.9	210.5	210.2	137.6	216.3	28.6
Mix No. 4	349.6	362.4	278.9	368.7	342.6	396.1	340.2	227.2

Table 4. . Core Knockout Time in Seconds

	Floor Type		System Type		Average,	Average,	Composite
	¼ in. Cstg.	½ in. Cstg.	¼ in. Cstg.	½ in. Cstg.	Floor Type	System Type	Average Time
Mix No. 1	10.1	1.6	23.5	4.7	5.8	14.3	9.9
Mix No. 2	18.6	3.0	45.6	18.1	10.8	31.9	21.3
Mix No. 5	33.8	10.4	45.6	65.2	22.1	55.4	38.9
Mix No. 3	586.3	38.8	1035.0	1068.0	312.6	1051.5	682.0
Mix No. 4	2055.0	161.4	3551.4	3276.0	1108.2	3413.7	2260.0

the same for both floor and system conditions and for both the ¼-in. and the ½-in. section castings. The average core knockout time in seconds for each of the castings is shown in Table 4.

As might be expected, cores left in the castings longer were easier to remove and cores surrounded by heavier casting sections knocked out more easily than those remaining in the castings for a shorter period of time or surrounded by lighter casting sections.

In the case of a floor-type foundry, increasing the metal section from ¼ to ½ in. caused a great reduction in core knockout time because, for all practical purposes the ½-in. metal section possessed twice as much heat as the ¼-in. Doubling the heat around the core reduced the knockout time to one sixth in the case of the two oil bonded cores, Mixtures 1 and 2. For Mixture 5 containing a cereal-rosin bond, a reduction to one-third was found. A reduction to one fifteenth for Mixture 3 resulted when the metal wall

of the casting was doubled. This core contained silica flour, western bentonite, cereal binder, and core oil. The pitch-bonded core (No. 4) knocked out in one twelfth of the time when ½-in. metal surrounded it instead of ¼ inch.

In a system type foundry one cannot expect the same degree of reduction in knockout effort for all types of cores as metal thickness of the casting is increased. A straight core oil bonded core (No. 1) showed a reduction to one fifth. Cores bonded with western bentonite, silica flour, or pitch require a long exposure to heat which they do not get in a system foundry, thus increasing casting section did not materially affect knockout time.

Relation of core knockout time to various laboratory tests is summarized below.

Baked Permeability. As permeability increased, knockout was easier, except in the case of Mixture 5. When similar mixtures are employed, higher permeability usually means easier core knockout.

Baked Strength. A weak core is obviously easier to remove from a casting than one of high strength. In the case of the five core mixtures studied, the strength of the cores may have had some influence on the core knockout time. There was, however, no definite correlation between room temperature core strength and the effort required to remove the cores from the castings.

Collapsibility is measured in seconds that a 1⅛ x 2-in. specimen will support a designated load at a specified elevated temperature. Specimens were loaded to 90 psi at 1500 F in these tests. Both air atmosphere and "own atmosphere" conditions were tried. When own atmosphere is reported in this paper, the dilatometer specimens were surrounded on the circumference and top by a close-fitting platinum hood. The objective was to duplicate, as nearly as possible, the atmosphere prevailing within the hot casting. The collapsibility tests in own atmosphere at 1500 F showed good correlation with core knockout time except for Mixture 5. It is likely that a preload of less than 90 psi might have been better.

Hot Compressive Strength. Hot compressive strengths were determined by heating 1⅛ x 2-in. specimens for 12 min. in a dilatometer furnace and then loading to failure. Tests were made under conditions of both air and own atmospheres. Hot strength measurements made in an air atmosphere showed no correlation with core knockout effort. When own atmosphere was used, the hot strength determinations were found to relate to the core knockout time for the core mixtures under study. Own atmosphere hot strengths at 2000 and 2500 F show good correlation with 2000 F appearing to be the better. Although only the surface layer of the core reaches this temperature, it was noted that once the surface layer of a core was broken away from the casting by the mechanical shakeout device, the core was quickly broken up.

Retained Compressive Strength. Retained compressive strengths were determined by heating 1⅛ x 2-in. specimens under specified conditions of time, temperature, atmosphere and loading in compression to failure at lower temperatures. Most tests involved heating the specimens and then allowing them to return to room temperature before testing. Retained strengths of specimens heated in air do not give good results. Some binders are quickly destroyed by a combination of heat and oxygen whereas they do have a measure of heat resistance in their own reducing atmosphere.

Very good correlation was found between core knockout time and retained strengths determined by heating specimens in own atmosphere at 800 F for 12, 20, and 30 min and then loading them after returning to room temperature under 200-ml beakers. Since heating times of longer than 12 min showed the same results, 12 min heating time is recommended. Temperatures above 800 F produced retained strengths of lower correlation; the low strengths also made it more difficult to secure reproducible results.

In another form of retained strength tests, the specimens were cooled to 200 or 300 F and loaded in compression. Correlation was no better, although actual foundry conditions were more closely simulated. Since it is difficult to control specimen temperatures without sepcial equipment, the room temperature test after heating for 12 min in own atmosphere is recommended.

Conclusions

1. The time required to knock out cores furnishes a good means of evaluating the work required to remove them from castings, providing a mechanical vibrating core knockout table is used to furnish the knockout energy.

2. Evidence to date indicates that the elevated temperature tests on cores should be made under own atmosphere conditions where the core test specimen is surrounded by a gas-tight container on all sides except at the bottom. A gas space ⅜ in. wide around the core, and extending ½ in. below the bottom of the core specimen proved satisfactory for test work undertaken in this investigation.

3. It was found that the hot compressive strength of baked core specimens (1⅛ x 2 in.) may be used to determine the order of core knockout effort of a group of core mixtures similar to those studied in this investigation. This hot compressive strength should be made on specimens heated in own atmosphere at 2000 F for 12 min with a table rise of one inch per minute.

4. This investigation showed that the retained compressive strength of baked core specimens (1⅛ x 2 in.) heated to 800 F in own atmosphere for 12 min, then cooled to room temperature under a 200-ml glass beaker with no lip, may be used to determine the order of core knockout effort of a group of core mixtures for iron castings.

5. The composition of the core mixtures influenced core knockout to a greater degree than other factors such as casting section thickness.

6. The core mixtures used in this investigation were formulated not as suggested core mixtures to be used in the foundry but merely to give a range of core knockout for test purposes.

Acknowledgment. Test cores and castings were made in the laboratory foundry of the University of Michigan. Sand tests were conducted in the laboratory of the Harry W. Dietert Co., Detroit.

Getting Men to THINK

Author models radio-equipped helmet to illustrate importance of safety thinking.

D. E. BEST / *Superintendent, Brass Foundry*
Bethlehem Steel Co., Bethlehem, Pa.

How he gets his men to think about safety was told by the author in a talk before the 1954 annual meeting of the National Safety Council.

■ The foreword of the Bethlehem Plant Supervisory Safety Code for 1951 included the following: "If everything outlined in this book were sincerely and completely followed, I am sure that our safety record would be as nearly perfect as humanly possible. In the business of accident prevention, we must aim for perfection, and we must settle for nothing less.

Booklet to Be a Guide

"Therefore, use this booklet as a guide, and improve on it whenever your imagination and abilities permit. The prevention of accidents is your No. 1 responsibility."—J. M. Sylvester, general manager.

Few, if any, can improve measurably on existing safety codes, which contain the thoughts of experts. How, then, can safety programs be improved?

Analysis of causes of accidents shows that human failures are responsible for 85 per cent of them. The three main accident factors are: I didn't see . . . I didn't think . . . I didn't know. These boil down to: I didn't think.

A man doesn't *see* because he doesn't *think* it is necessary to look. He doesn't *know* because he doesn't *think* it is necessary to learn the facts, answers, rules, or laws before acting.

How do you get people to think . . . to use their brains . . . to remember things at the right time? By education.

Everyone acquires information and knowledge through his five senses—sight, hearing, touch, taste, and smell. The more of these that are used to instruct the employee, the greater the impression, the more lasting the memory. Therefore, in telling the employee something, try to add a visual aid or appeal to some sense other than just hearing. Shakespeare put it: "Action is eloquence, and the eyes of the ignorant are more learned than their ears."

While individuals may be catalogued over a wide range of intelligence, human reactions, motivations, desires, feelings, fears, loves, etc., are much the same throughout the range. The reaction to a burn, the love of sports, the taste for good food, the love of family, the desire to remain happy and free from injury are actually much the same for all normal beings.

If the supervisor tries to analyze and understand some of his own reactions and behaviors, he will come closer to understanding the behavior of those who work for him. This is psychology, the branch of the sciences which concerns itself with the study and understanding of the behavior of people.

If the supervisor understands that people like to be a part of something rather than a spectator or listener only . . . if he believes that people would rather laugh than cry . . . that they like to see their names in print . . . that they read and reread the written story of something concerning themselves although they know all the details from having been present . . . and if he applies these and other psychological facts in his dealings in safety, he has a ready means of communicating his knowledge to others.

Fail to Heed Safety Rules

Normal human beings resent orders and consequently fail to heed many of the safety rules and instructions when told to do so. A much better way is to instruct the individual in such manner that he will arrive at the correct answer to the problem.

For instance, the writer had a problem involving eye protection that did not respond fully to instruction "Wear your goggles." The idea of making a John Doe Accident Investigation was hit upon. The Investigating Committee was

composed of the safety supervisor, the men involved, and the writer. Through the investigation, the men arrived at exactly the same conclusions that supervision had, and there has been no trouble since. The John Doe Accident Investigations have been used several times in similar situations, and always with the desired results.

In these investigations, a fake accident is set up. Then all the factors that might tend to cause such an accident are listed with the aid of men who might be involved in this type of accident.

Two departments conduct combined safety meetings for the foremen and the hourly rated employees. In these meetings, the object is to strike a responsive chord in the individuals. Because participation sharpens interest, the men are asked to give prepared papers before their fellow workers. As many individuals as possible are involved in demonstrations and contacts so the memory will be more lasting. Due to the added interest, more helpful ideas are exchanged. Props and gimmicks are used to fasten attention on the safety talks, to take them out of the all-talk, all-statistics category, and to help the men see the points they are supposed to see.

Here are some of the props and a brief commentary on how they are used. Each is the subject of a 10 to 15 minute talk.

1. Underwriters Knot. Job Instruction Training method of demonstrating proper teaching method. Based on the fact that telling is not enough; showing is not enough. Tell, show, and follow-up to be sure the job is being done correctly.

2. Football Play Diagram. Proper coordination—everyone doing his job as he is trained to do it. Result is a touchdown—successful conclusion of an assignment.

3. Radio-Equipped Safety Helmet. Hypothetical plan in which observers in shop are to radio instructions each time a man does something in an unsafe manner. Hazards are connected with use of this helmet, such as aerial piercing skull, wrong man following instructions, etc. However, plan is finally junked in favor of program in which each man uses his God-given brains to work safely.

4. Blindness. Blindfolded employees perform simple tasks with bandages, cigarettes, matches, and water glasses. Their failures point up the effects of blindness and dramatize the need for proper eye protection.

5. Chance-Taking Raffle. In this demonstration, dimes were distributed to the men in the meeting. Chances on $5.00 were sold at 10 cents each. Everyone bought a chance including the writer. Who won the prize? The writer – he palmed his stub. This initiates a safety talk on chance taking. He who takes enough chances is almost sure to win, but who wants the prize for taking chances on safety?

6. Saxophone. During a number by a musician, the writer causes a sour note to be played—enough to spoil the presentation by an entire symphony orchestra. Parallel is that one accident is sufficient to spoil the record of an entire plant. Discussion of training, practice, and maintenance of equipment follows.

7. Aesop's Fable: "A Bundle of Sticks." Banded together a group is strong. Separated from the group —deviation from safe practice— makes a man easy prey to accidents.

8. Road Map—Highway to Safety. There are many routes to a destination, but some have more hazards than others. Best practice is to follow the safest route. Some may come to a "dead" end if a wrong turn is made. Highway signs (safety signs) point the way. If not sure, slow down, obtain instructions about the proper way.

9. Chain—Tug of War. Safety is no stronger than the weakest link in the program. If men, supervision, and Safety Dept. pull in different directions there is no progress. When all pull together the job is easy.

10. Mirror on the Wall. Reflected in any mirror into which a man looks is the one who can do the most for his safety.

11. Playpen. Mothers have playpens in which children may be placed for protection. Industry has no playpens and cannot tolerate horseplay—some grownup's idea of fun.

12. Reasons. List every man's name and his loved ones as reasons why all in the shop should work safely.

13. Quiz Program. Workers fill in a quiz paper from which they select one of three or four answers to questions on safety facts. This shows shortcomings to the individuals and indicates their need for training or study.

14. Driver Instruction Training.

Props used by the author to bring 15-minute safety message home to his foundry workers.

One sour note can spoil the whole performance of an orchestra. One accident can spoil the plant safety record;

Borrow training devices from local school. Give men an opportunity to test themselves. Shows need for care in driving.

15. State Police Accident Photos. Use official photos of highway accidents which have occurred in district—gruesome and sobering. They highlight need for greater caution on the highways.

16. Undefeated Football Season vs. Perfect Safety Record. This is particularly useful during football season. Comparisons may be drawn for top supervision, foremen, or working men. The example below applies to supervision. Discussion goes like this:

Coaches of Safety Program

We are coaches of the safety program. We must surround ourselves with capable assistance (foreman) if we are to be successful. Just as the coach must plan his job, so must we plan ours. As he must select the best players for each position so must we, as far as circumstances permit, place our workers in the jobs to which they are best suited. As the coach must explain the rules and the plays, so must we teach rules, working procedures, and so on. (Numerous other comparisons and correlations may be drawn.)

One thing holds as true for us as for the coach. If we do not get into the job whole-heartedly, if we do not give it the best we have available in equipment, training, and follow-up, we can look for the same poor results the coach undoubtedly will get.

In using any of these props, the idea is to sell the individual on incontrovertible facts which the props are meant to illustrate. If the proper companions and correlations with safety are drawn, the worker will accept the idea of safety.

Actions are governed by an individual's last thought. Thus, to the well-known Safety First slogan should be added: "Let your last thought be of safety."

Calendar of Future Meetings and Exhibits

1955

January

5-7 . . Institute of Scrap Iron & Steel
Miami Beach, Florida. Annual Convention.

21 . . Malleable Founders' Society
Hotel Cleveland, Cleveland, Ohio.

24-25 . . Industrial Heating Equipment Association, Inc.
Sheraton - Cadillac Hotel, Detroit. Annual Meeting.

24-27 . . Plant Maintenance & Engineering Show
International Amphitheatre, Chicago.

February

10-11 . . Wisconsin Regional Foundry Conference
Hotel Schroeder, Milwaukee. Sponsored by AFS Wisconsin Chapter.

14-17 . . Industrial Ventilation Conference
Michigan State College, East Lansing, Mich.

14-18 . . American Institute of Mining & Metallurgical Engineers
Conrad Hilton Hotel, Chicago. Annual Meeting.

17-18 . . Southeastern Regional Foundry Conference
Tutwiler Hotel, Birmingham, Ala. Sponsored by AFS Birmingham and Tennessee Chapters.

March

9-10 . . Foundry Educational Foundation
Hotel Cleveland, Cleveland. College-Industry Conference.

14-15 . . Steel Founders' Society of America
Drake Hotel, Chicago. Annual Meeting.

14-18 . . American Society of Tool Engineers
Shrine Auditorium, Los Angeles. First Western Industrial Exposition.

25-26 . . California Regional Foundry Conference
Huntington Hotel, Pasadena, Calif. Sponsored by AFS Northern California and Southern California Chapters.

28-Apr. 1 . . American Society for Metals
Pan-Pacific Auditorium, Los Angeles. Ninth Western Metal Congress and Western Metal Exposition.

April

7-8 . . Malleable Founders' Society
Edgewater Beach Hotel, Chicago. Market Development Conference.

18-19 . . Third National Air Pollution Symposium
Pasadena, Calif.

May

6 . . American Association of Spectrographers
Chicago. Sixth Annual Conference.

16-20 . . Sixth National Materials Handling Exposition
International Amphitheater, Chicago.

23-27 . . American Foundrymen's Society
Houston, Texas. 59th Annual Convention. Non-Exhibit.

31-June 3 . . Third Basic Materials Exposition
Convention Hall, Philadelphia.

June

15-17 . . American Society of Training Directors
Ambassador Hotel, Los Angeles. Annual Convention.

16-18 . . Malleable Founders' Society
The Greenbrier, White Sulphur Springs, W. Va. Annual Meeting.

How to Use High Scrap Charges in the Cupola

Good Practice . . . Precautions . . . Scrap Specifications

Condensed from the chapter on "Scrap for Cupola Mixtures" of the AFS book The Cupola and Its Operation.

■ Certain foundries make a practice of utilizing very high proportions of scrap in cupola mixtures, either because of ready availability or for economic reasons. The usual charge for production of a medium-soft grade of gray iron by conventional acid melting probably contains 25 to 40 per cent of pig iron and 35 to 40 per cent of foundry returns. Such a charge can contain only 20 to 40 per cent of purchased iron and steel scrap.

Some foundrymen believe a certain proportion of virgin pig iron is highly desirable in preventing foundry difficulties such as excessive shrinkage, warping and cracking of castings, etc. However, it has probably not been definitely established that the difficulties sometimes encountered in using high scrap charges are not actually due to variation in the chemistry of the iron.

Satisfactory use of high proportions of scrap no doubt requires more skill in formulating the charge and better control of the melting process than a more conservative practice. That it can be done is proved by the successful foundries that have for years melted iron of good quality using charges containing little or no pig iron.

The following suggestions may prove helpful in developing a practice built around the use of high proportions of scrap.

1. Control of Carbon. As scrap is almost invariably lower in carbon than the pig iron it replaces, unusual measures may have to be employed in order to obtain metal of the desired carbon content.

The carbon content of cast iron is fixed not only by the metal charge but, also, by melting conditions; a high bed and liberal coke splits tend to produce hot metal of higher carbon content than when less fuel is used. A soft blast will also tend to produce higher carbon metal than when the cupola is blown at a higher rate. Cokes vary considerably in structure, and the carbon in some cokes is in a form more readily soluble in cast iron.

In general, coke which is low in ash content and reactive in nature will produce metal of higher carbon content than coke which is higher in ash or of a very dense structure. Large sized coke will produce higher carbons than fuel of the smaller sizes. Special fuels of very low ash content, such as pitch coke or special high carbon coke, can be used as a portion of the fuel to increase carbon.

Several materials used as carbon raisers in cupola melting include various forms of carbon, such as scrap graphite electric furnace electrodes, graphite briquets, chunk natural graphite, etc. In general, the efficiency of these materials varies inversely with their ash content. Calcium carbide added in quantities up to 2 per cent of the charge has proved effective in increasing the carbon content of acid melted iron.

Efficient fluxing is important because carbon pickup depends upon contact between incandescent coke and metal dripping through the coke bed. Sufficient flux should be used to produce a highly fluid slag which will readily flux away coke ash and other siliceous material.

The silicon content of the metal has an effect on carbon absorption in that an equilibrium exists in cast iron between silicon and carbon, with carbon solubility decreasing with increase in silicon. Where carbon solution is a problem, it may be well to melt a metal lower in silicon than desired in order to obtain a higher content of carbon in the metal. It has been common experience that a decrease of 0.25 per cent in silicon charged will usually result in a gain of about 0.08 per cent in the carbon content of the metal. The deficiency in silicon can be easily made up by ladle addition of ferrosilicon at the cupola spout.

2. Control of Contaminants. Increasing the relative amount of scrap in the charge makes it all the more important that contamination be avoided. It is essential the scrap in high scrap charges be clean and free of non-ferrous attachments, aluminum pistons, bearing metals, etc.

3. Control of Chemistry. Because individual pieces of scrap may vary widely in analysis it is important to have a cupola well that will hold and mix two or three charges. It is desirable and often practical to add a forehearth or mixing ladle. These should be as large as practical and kept full as possible in order to afford maximum blending which will minimize the abnormal chemistry of individual scrap pieces.

As the proportion of scrap increases it becomes more important also to carefully grade the material for size in order to avoid adverse melting conditions.

Manganese additions in the form of manganese briquets or ferromanganese should be added to compensate for the higher sulphur of high scrap charges. The charge should contain five times as much manganese as sulphur; thus a charge containing 0.15 per cent sulphur should have 0.75 per cent manganese. Manganese loss of 15 per cent of that charged can be expected.

It is often necessary to desulphurize the metal to meet casting specifications. The most commonly used desulphurized is soda ash or sodium carbonate in the form of fused cakes or soda briquets. Sodium sesquicarbonate is also used. A new development is injecting powdered calcium carbide, suspended in nitrogen gas, into molten metal in the ladle.

4. Selecting a Suitable Charge. Selection of suitable scrap for the castings to be produced must include consideration of phosphorus content, the effects of alloys, silicon content, etc. The use of steel scrap must also be considered. Melting losses will require a supply of silicon briquets, silvery iron or lump ferrosilicon, as well as manganese briquets or ferromanganese as sources of these elements.

Precautions in the Use of Scrap

Inasmuch as scrap is likely to vary from piece to piece in both analysis and weight or section thickness, certain precautions are desirable if satisfactory metal is to be obtained.

1. When large quantities of scrap are purchased from several sources it is often desirable to spread each incoming shipment over the pile to obtain as much mixing as possible rather than to use right from the car as received. In this way, the effect of peculiarities which may apply to a given shipment can often be minimized.

2. If large percentages of scrap are used, it is wise to provide for a liberal well capacity and use of an adequate mixing ladle or receiver in order to minimize the possibility of a large individual piece in the charge unduly affecting the metal analysis.

3. Changes in the type of scrap may require adjustment of the balance of the charge to compensate for variation in chemistry. Thus, many types of steel have manganese of around 0.30 per cent and silicon under 0.01 per cent, while other types may be considerably higher in both elements.

4. Railroad car wheels and other heavy iron scrap should always be broken before use.

5. When charges are made up manually, the charging crew can do much to promote uniformity by mixing heavy and light scrap or scrap of different types rather than using all of one type on individual charges. The same thing can often be done to a lesser extent using magnet make-up.

6. Charging crews can watch for nonferrous attachments and other contamination. A small bonus for such material removed will sometimes uncover astonishing quantities of these materials and substantially reduce the possibility of serious difficulty.

7. Yard personnel and charging crews should be instructed to promptly report any unusual or suspicious material encountered in the course of their work.

Tramp Elements in Scrap

A pile of iron scrap may contain many chemical elements because the pieces may be painted, plated, welded, brazed, or coated in various manners. It may also contain attachments like: spark plugs, bearings, grease cups, wood, cement, plaster, etc. Fortunately, most of these materials are present in small amounts and do little or no harm.

Among the tramp elements which usually are not harmful in small amounts are such alloys as nickel, chromium, cobalt, copper, molybdenum, titanium, and vanadium. These elements are often added to molten iron to improve the properties of the castings. However, excessive and erratic amounts of alloys introduced in the scrap may be harmful in the production of soft iron castings where machinability is a major requirement.

Cast iron has a low tolerance for the following non-ferrous metals:

Aluminum in quantities in the order of 0.05 per cent or even less, may be the cause of pinholes in light-section castings poured of soft iron. In larger amounts, it renders the metal sluggish in pouring and causes the formation of dross, resulting in surface defects in the casting.

Antimony is a constituent of enameled scrap and of many bearing metals. Whether present as metal or reduced from enamel, it is harmful to the static and impact properties of cast iron. Antimony has been reported to interfere with satisfactory enameling of sanitary ware. It has also been reported to cause a reduction in strength and impact when present in relatively small quantities under 0.25 per cent.

Bismuth occurring in bearing metal, seriously decreases the strength of cast iron.

Boron is found principally in enameled scrap. The amounts which might be introduced in this form are unlikely to cause difficulties in cast iron.

Cadmium derived from cadmium-plated metals and non-ferrous alloys is very volatile, and is probably eliminated during the melting process.

Lead alone or in lead-bearing alloys has been reported to cause extreme gas porosity in castings, although only traces can be retained in cast iron. When present in any amount, it collects in the bottom of the cupola well and may penetrate the bottom sand.

Sulphur may be derived from sulphur cements, rubber, or plaster of Paris.

Tellurium may be derived from nonferrous attachments. As little as 0.001 per cent has a marked effect on producing chill.

Tin may be present in the form of tin plate, bearing metals, or in the steel and cast iron scrap. All tin melted goes into the iron melted. It is reported to cause an increase in the Brinell hardness and to reduce both tensile strength and, particularly, impact properties.

Zinc from galvanized coatings on scrap is not likely to be retained in the iron in any appreciable amount as it volatizes and oxidizes readily. It may, however, be carried into cast iron with copper, in which case it is reported to be detrimental to both impact and tensile strength.

Iron and Steel Scrap Specifications

Number One Machinery Cast Scrap shall consist only of first quality cast scrap which possesses evidence of having been machined, i.e., planed or turned surfaces or bored or drilled holes. Pieces must be of cupola size and must not weigh more than 150 lb or exceed 24 in. in length or 18 in. in width.

NON-ACCEPTABLE: car wheels, brake shoes, stove plate or any burnt, chilled, malleable hard iron, or steel. The following must not be shipped under this classification without special permission of the buyer: locomotive wheels and cylinders, broken machinery and similar high grade cast scrap, broken to cupola size, which may not show evidence of machining.

Number One Machinery Breakable Scrap shall consist of cast iron scrap weighing more than 150 lb which can be broken under a drop ball. It must be free from chilled iron and steel scrap. In respects other than size, breakable scrap shall conform to the specifications for No. 1 machinery cast scrap.

Auto Cast Scrap shall consist of auto cylinder blocks, heads, manifolds, crankcases and flywheels, clean and reasonably free from grease and dirt.

NON-ACCEPTABLE: crankshafts, connecting rods, magnetos, transmission gears, loose piston rings, and all steel and malleable attachments, except camshafts, valves, studs, and nuts.

Number One Agricultural Cast Scrap shall consist of cast gray iron parts of agricultural machinery. Pieces must not weigh more than 150 lb nor exceed 24 in. in length or 18 in. in width.

NON-ACCEPTABLE: steel, malleable and chilled iron, such as plow points, car wheels, brake shoes, stove plates, and white or burnt iron of any description.

Number One Railroad Cast Scrap shall consist of railroad cast scrap, no piece to weigh more than 150 lb nor to exceed 24 in. in length or 18 in. in width.

NON-ACCEPTABLE: stove plate; grate bars, car wheels, steel; malleable, chilled, white or mottled iron.

Car Wheels shall consist of clean, cast iron freight car wheels.

Stove Plate Scrap shall consist of clean stove plate.

NON-ACCEPTABLE: malleable iron and steel parts, grates, burnt iron, and other miscellaneous scrap usually collected with this material.

Malleable Scrap shall consist of all kinds of malleable castings from railroad equipment; also, from automotive and agricultural machinery. No piece is to weigh more than 150 lb, nor to exceed 24 in. in length or width.

NON-ACCEPTABLE: gray iron or steel parts.

Brake Shoe Scrap shall consist of driving and railroad car brake shoes of all types except composition-filled shoes.

Foundry Melting Steel Scrap shall consist of steel or wrought iron from ¼ in. in thickness up to 1½ in. in thickness for flat pieces, and from ½ in. diameter to 2½ in. diameter for round pieces. No piece shall weigh over 50 lb. No piece shall be over 24 in. long or 18 in. wide, nor be less than the equivalent of ½ in. square and 10 in. long. Individual pieces must be trimmed of attachments and cut into shapes that will not tangle with other material in the charging buckets or in the cupolas. Scrap must be clean and free from dirt, refuse, and burnt material.

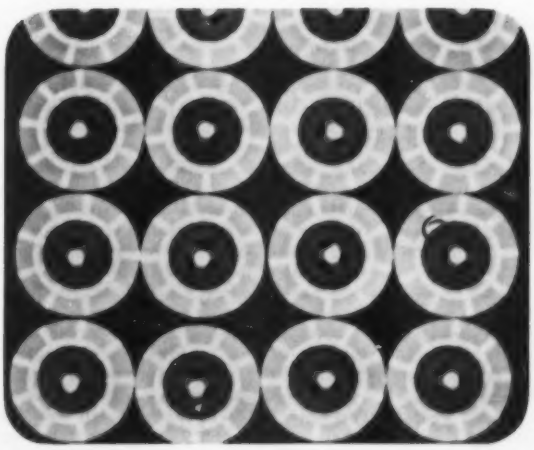
NON-ACCEPTABLE: cut pipe, punchings, turnings, curly materials, and alloys.

Cut Rails shall consist of 50 lb or over standard section rails cut to lengths of 2 ft or less, free from concrete and other foreign material.

Structural and Plate shall consist of clean open hearth steel (containing not over 0.04 per cent phosphorus or 0.04 per cent sulphur) such as plates, structural shapes, shearings, punchings, and crop ends. Maximum size shall be 2 ft long x 12 in. wide (18 in. diameter for circular material) having a maximum weight of 100 lb to determine maximum thickness. Minimum size shall be ¼-in. section with minimum weight of ½ lb to determine minimum length and width. To further qualify minimum size and weight, not more than 5 per cent (by weight) of material less than 1-lb unit weight will be acceptable in any one shipment. Individual pieces must be free of all attachments, dirt and excessive rust or scale.

SPINS LIKE "BLAZES"—

so Radiography checks each one



Radiograph of oil scavenger rotor in variable displacement pump for aircraft hydraulic systems.

"BLAZES" is not the word—but suggests the maker's shorter expression for the rate at which this rotor spins. Fact is, rpms are so high that the soundness of the casting is important in terms of safety as well as serviceability.

So radiography goes to work and plays its unique part. With no damage to the product, radiography looks inside the part and checks each rotor's structure. Only flawless parts will meet the strict requirements of service.

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Announce Committees and Special Events for

1955 AFS Convention

F. M. Wittlinger

J. O. Klein

Edward W. Wey

WITH PLANS for the 1955 AFS Convention—Houston, May 23-27—well along, General Manager Wm. W. Maloney has announced that most of the meetings will be held at the Rice and the Shamrock Hotels. Housing applications, which in former years were mailed directly to members, this year will reach the foundry industry as a tear-out page in the February issue of AMERICAN FOUNDRYMAN. Readers are urged to submit applications for hotel rooms as soon as possible after receipt of the February issue even though all applications received by a date to be announced will be considered as of that date.

Meanwhile, Convention committees and early program plans have been announced by General Chairman F. M. Wittlinger, Texas Electric Steel Casting Co., Houston. Special features include a ladies program, post-Convention tours, plant visits, and Texas Chapter Night. Program for the ladies will feature a trip on the Houston ship channel, a theater matinee, and a luncheon and style show—all in addition to the AFS Tea, Monday May 23, the Annual Banquet, Wednesday May 25, and Texas Chapter Night, Thursday May 26.

Post-Convention airline tours of Mexico are being developed with details to be announced soon.

Plant visits are being planned around a product and market development theme. Thus, they will include not only foundries, but also local industries which will illustrate how castings are used and what non-cast parts might be converted to castings.

Texas Chapter Night will be highlighted by an outdoor barbecue and western entertainment complete with horses, guns, and ropes.

As usual, technical sessions are grouped by foundry interest to enable Convention-goers to take in the greatest number of meetings in the shortest possible time. Thus, brass and bronze, malleable, and light metals sessions are scheduled for the early part of the week while gray iron and steel are scheduled for the middle and latter part.

Sand sessions will run throughout the week. Others, such as safety, hygiene, and air pollution control, education, industrial engineering, refractories, and heat transfer are planned for the middle of the week.

Technical highlights of AFS Convention Week will be the Charles Edgar Hoyt Lecture the morning of Wednesday May 25, with Fred J. Walls, International Nickel Co., Detroit, as speaker. The Hoyt Lecture will follow the Annual Business Meeting at which President Frank J. Dost, Sterling Foundry Co., Wellington, Ohio, will deliver his presidential address and present cash awards and certificates to top winners in the AFS Apprentice Contest.

In addition to the more formal technical meetings at which prepared papers will be presented, there will be a number of round table luncheons and shop course sessions. The informal, give-and-take discussions of these sessions will appeal again, as in the past, to foundrymen interested in learning how others have solved practical production problems.

Program details of some of the technical sessions have been published in the October, November, and December issues of AMERICAN FOUNDRYMAN. In addition, the following statement regarding malleable sessions has been issued by Frank B. Rote, Albion Malleable Iron Co., Albion, Mich., program chairman of the Malleable Div.:

The Malleable Div. has planned three technical sessions, a round table luncheon, and two shop course meetings. One technical session will deal exclusively with the AFS-sponsored research at the University of Wisconsin. Report on work during 1954 will be presented, and a panel of foundrymen who have applied previous results of the research will tell their experiences. Discussion from the floor will be encouraged to provide the widest possible coverage of the subject.

Another technical session, featuring two papers on trace elements, is considered particularly timely as knowledge of boron, bismuth, tin, etc., increases and demand for closer control of trace elements becomes greater. The third technical session will cover general subjects of interest to all malleable foundrymen.

The Malleable Round Table Luncheon will have as speaker B. C. Yearley, National Malleable & Steel Castings Co., Cleveland. He will discuss the state of the industry's knowledge on solidification of malleable iron and tell how to reduce foundry costs.

The Malleable Shop Course sessions will be conducted by panels of foundrymen with wide experience in the subjects to be discussed. These are *"Pearlitic Malleable"*—especially timely because malleable foundrymen are enjoying increased business due to expansion in markets for pealitic, and *"Hot Tears"*—a constant source of loss to producers of malleable castings.

Convention committees have been set up as follows:

General Convention Committee. *Honorary Chairman,* J. O. Klein, Texas Foundries, Inc., Lufkin; *General Chairman,* F. M. Wittlinger, Texas Electric Steel Casting Co., Houston; *Vice-Chairman,* Edward W. Wey, Dee Brass Foundry, Inc., Houston; *Secretary,* J. D. Magee, Federated Metals Div., American Smelting & Refining Co., Houston; *Treasurer,* E. F. Laminack, Texas Steel Co., Forth Worth.

Housing Committee. *Chairman,* W. H. Lyne, III, Hughes Tool Co., Houston; *Vice-Chairman,* T. B. DeYoung, Quality Electric Steel Castings Co., Houston; John G. Collier, Garrott Brass & Machine Co., Houston; Elmore C. Brown, Whiting Corp., Houston; O. L. Spencer, Lawndale Pattern Works, Houston.

Shop Course Committee. *Chairman,* John M. Bird, American Brass Foundry, Fort Worth; *Vice-Chairman,* Arthur P. Guidi, Texas Electric Steel Casting Co., Houston; Ivan L. Greene, Eastern Clay Products, Inc., Fort Worth; C. L. Boone, Texas Steel Co., Fort Worth; G. Byron Keith, Acme Brick Co., Houston; Frank G. Schneider, Acme Pattern Works, Houston; J. H. Kimes, Jr., Lufkin Foundry & Machine Co., Lufkin; David K. McKie, Tyler Pipe & Foundry Co., Tyler; B. J. Peters, Service Foundry, Div. Avondale Marine Ways, Inc., New Orleans; Stewart E. Brown, Texas A. & M. College, College Station; H. H. Judson, Kincaid-Osburn Electric Steel Co., San Antonio; E. O. Naquin, Oil City Brass Works, Beaumont.

Plant Visitation Committee. *Chairman,* Marvin W. Williams, Houston Foundry & Machine Co., Houston; *Vice-Chairman,* Robert C. Wittlinger, Pioneer Foundry, Houston; George E. Bush, Cleco Div., Reed Roller Bit Co., Houston; Joseph R. Skyvara, Jr., Skyvara Foundry, Houston; Dale Culwell, MacKay Foundry, Inc., Lufkin.

Publicity Committee. *Chairman,* P. B. Croom, Houston Pattern Works, Houston; *Vice-Chairman,* T. E. Honohue, Cleco Div., Reed Roller Bit Co., Houston; Herman J. Pfeifer, Jr., Electro Metallurgical Co., Div. of Union Carbon and Carbide Corp., Houston; W. H. Auydam, Harbison-Walker Refractories Co., Houston; William A. Bearden, M. A. Bell Co., Houston.

Reception Committee. *Chairman,* T. H. Shartle, Texas Electric Steel Casting Co., Houston; *Vice-Chairman,* E. P. Trout, Lufkin Foundry & Machine Co., Lufkin; C. C. Chambers, Texas Foundries, Inc., Lufkin; Melrose Holmgreen, Alamo Iron Works, San Antonio; Walter Krueger, San Antonio Machine & Supply Co., San Antonic, Joseph Kincaid, Kincadi-Osburn Electric Steel Co., San Antonio; E. B. Germany, Lone Star Steel Co., Dallas; John H. Royall, Royall Fire Brick & Supply Co., Houston; Henry J. LeBlanc, Standard Brass & Mfg. Co., Port Arthur; George E. Bryant, Jr., Oil City Brass Works, Beaumont; George W. Armstrong, Jr., Texas Steel Co., Forth Worth; Harry E. Rogers, Hughes Tool Co., Houston; C. V. Smith, Jr., Smith Steel Castings Co., Marshall; C. H. Elliott, Cleco Div., Reed Roller Bit Co., Houston.

Banquet Committee. *Chairman,* Israel Smith, Western Foundry Co., Tyler; *Vice-Chairman,* L. O. Sturkie, Quality Electric Steel Castings Co., Houston; J. J. Chandler, Tyler Pipe & Foundry Co., Tyler; R. S. Bradshaw, Jr., Texas Foundries, Inc., Lufkin; Robert H. Lang, Lufkin Foundry & Machine Co., Lufkin; C. W. Williamson, Trinity Valley Iron & Steel Co., Inc., Fort Worth; J. M. Hollingsworth, Lone Star Steel Co., Dallas; R. H. Glenney, Alamo Iron Works, San Antonio; William Clarkson, III, Oil City Iron Works, Corsicana; Edward D. Kranz, Texas A. & M. College, College Station; Wilbur A Bittel, Royall Fire Brick & Supply Co., Dallas; Herman F. Bolman, Star Foundry Co., Houston; Wilbur Bittel, Royall Fire Brick & Supply Co., Dallas.

Texas Chapter Day Committee. *Chairman,* James R. Hewitt, Texas Foundries, Inc., Lufkin; *Vice-Chairman,* Jake Dee, Dee Brass Foundry, Houston; Charles R. McGrail, Alamo Iron Works, San Antonio.

Ladies Entertainment Committee. *Chairman,* Mrs. Jake Dee; *Vice-Chairman,* Mrs. James R. Hewitt.

Post Convention Tour Committee. *Chairman,* F. M. Wittlinger, Texas Electric Steel Casting Co.; Harvey Trevel Bureau, Houston.

AFS Past President L. L. Anthes Dies

LAWRENCE LEE ANTHES, the only Canadian honored with the office of president of the American Foundrymen's Society, died November 23 at his home in Toronto, Ont. He would have been 78 on November 26. The 11th president of AFS, he was at the time of his election in 1908 the youngest man to hold the position. He also served on the Administrative Council of National Foundry Association. Formerly president of Anthes Foundry, established by his father in 1894, he retired several years ago.

Lawrence L. Anthes . . . 1876-1954

Mr. Anthes was connected with a number of companies, serving as board chairman of Anthes-Imperial Ltd., Toronto; president and managing director, Anthes Foundry Ltd., Toronto; chairman of the board, Anthes-Tait Foundry Ltd., Vancouver; board chairman, Imperial Iron Corp., Ltd., St. Catharines; president, Lennox Furnace Co. of Canada, Ltd., St. Catharines; and director, Canada Western Cordage Co., Ltd., New Westminster.

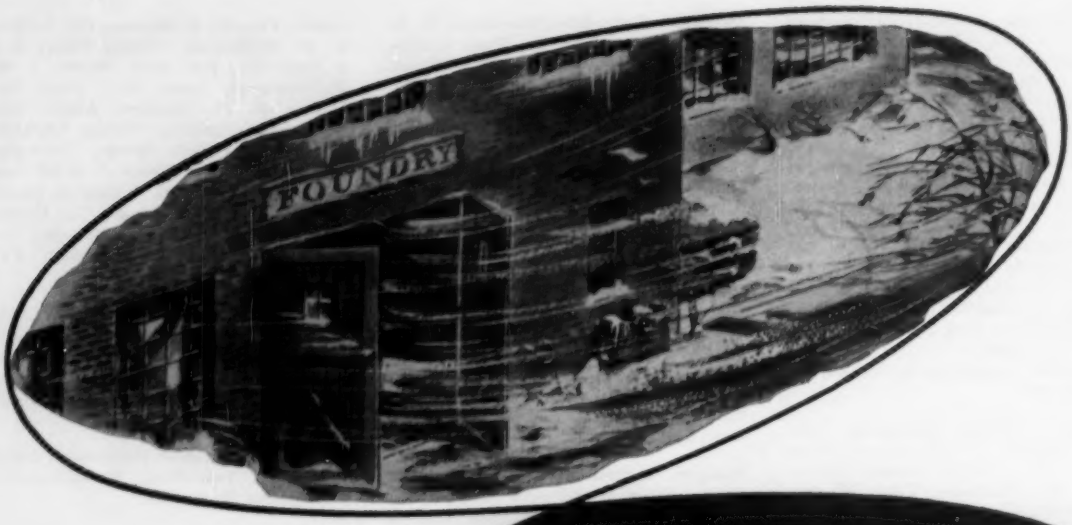
Born in Toronto, Mr. Anthes commanded the 2nd Field Co., Canadian Engineers, with headquarters in that city, during World War I. He was later in charge of the demobilization branch of the Department of Soldiers' Civil Re-establishment in Ottawa.

Major Anthes joined the staff of Anthes Foundry in 1896—the year AFS was founded—and succeeded his father as secretary-treasurer in 1914. He became president of the company in 1932. He interrupted his business career for three years to join the editorial department of the Toronto *Telegram.*

A member of the Canadian Manufacturers' Association for half a century, Mr. Anthes was elected chairman of the Toronto branch in 1917, and chairman of the Industrial Relations Committee in 1926. He became president of the association in 1933 and in 1952 was elected to life membership.

He was a member of the Engineers' Club of Toronto, Military Institute, Royal Canadian Yacht Club, Albany Club, Laurentian Club (Ottawa), Carlton Club (Winnipeg), and Winnipeg Golf and Country Club. He was interested in art and drama and organized a club which produced several light operas. He served as superintendent of the Sunday school, St. John the Evangelist Church.

Survivors are a daughter, Jane McLean Anthes, and two sisters, Mrs. Herbert Locke, and Miss Libbie Frances Anthes.



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How Castings Do It Better Shown By GIFS Redesign Contest

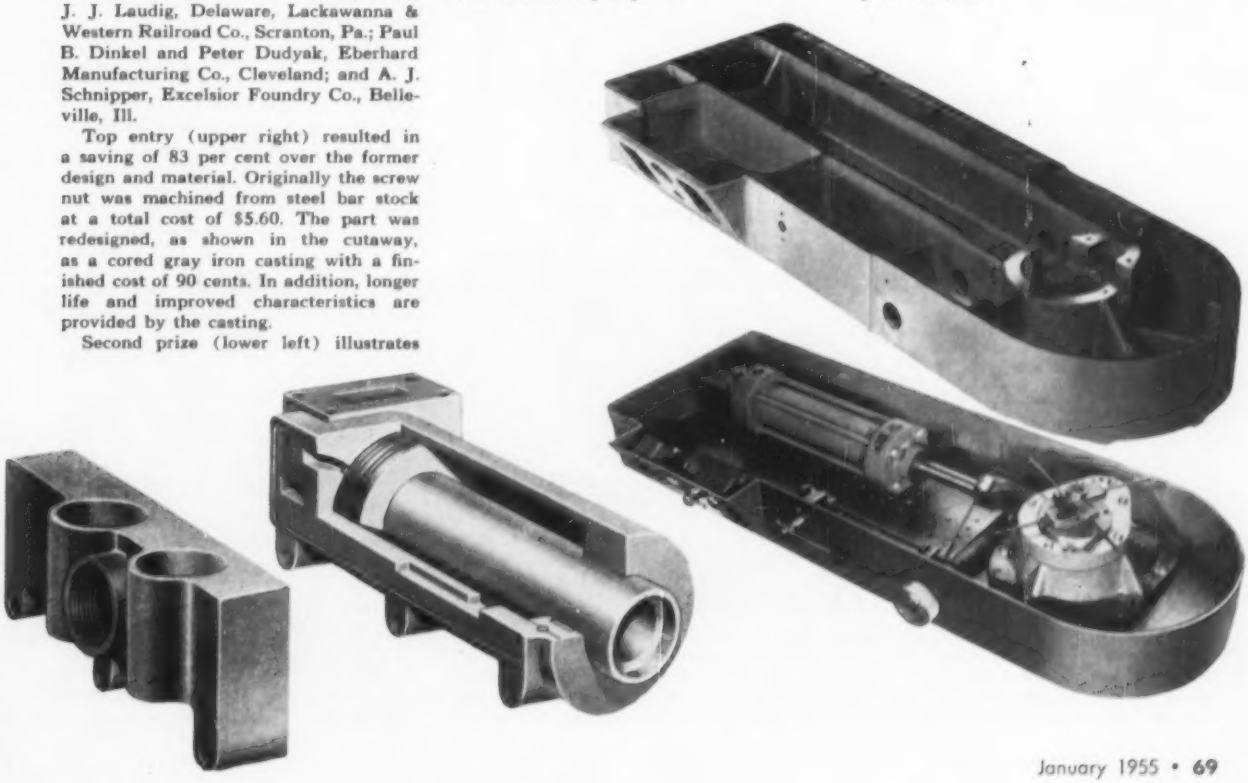
THIS YEAR'S WINNERS in the annual Redesign Contest of the Gray Iron Founders' Society again demonstrated that "the casting process is the shortest distance from raw material to finished product." The top entries also show again that redesign is an outstanding sales tool.

Winners of the $500, $250, and $100 prizes are: William S. Thomas, Emmaus Foundry and Machine Co., Inc., Emmaus, Pa.; Russell W. Henke, Research and Development Div., Badger Meter Manufacturing Co., Milwaukee; and Paul C. Nelson, O'Neil-Irwin Manufacturing Co., Lake City, Minn. Honorable Mentions were awarded to: L. R. Kells and C. Hempfing, R. H. Sheppard Co., Inc., Hanover, Pa.; C. W. Gilchrist, Cooper-Bessemer Corp., Mount Vernon, Ohio; J. J. Laudig, Delaware, Lackawanna & Western Railroad Co., Scranton, Pa.; Paul B. Dinkel and Peter Dudyak, Eberhard Manufacturing Co., Cleveland; and A. J. Schnipper, Excelsior Foundry Co., Belleville, Ill.

Top entry (upper right) resulted in a saving of 83 per cent over the former design and material. Originally the screw nut was machined from steel bar stock at a total cost of $5.60. The part was redesigned, as shown in the cutaway, as a cored gray iron casting with a finished cost of 90 cents. In addition, longer life and improved characteristics are provided by the casting.

Second prize (lower left) illustrates the advantage of a casting in combining a number of complex shapes in a single part. A fabricated hydraulic circuit containing 35 parts was reduced to 13 parts when redesigned for gray iron. With 22 less parts, the cast unit is compact, more efficient, less costly, and has done away with numerous external connections and all the welding and pre-welding preparation formerly required.

The third prize winner (lower right) is a machine table top. As a gray iron casting, the table top is produced in 7½ hr, has a better appearance, and has the gearbox cast integrally with ribbing to give rigidity not obtained on the fabricated assembly it replaced. The fabricated machine table top, made of torch-cut steel segments, required 22¾ hr production time.



Latest AFS Transactions Today's Foundry Technology

The 1954 AFS TRANSACTIONS, vol. 62, is now available to AFS members and non-members alike; pre-publication subscribers have already received their copies. This book contains the proceedings of the 58th annual meeting and 95 technical papers representing all phases of the foundry industry with reports on AFS-sponsored research, AFS technical committee work, and papers with discussions (including exchange papers) presented at the Cleveland convention.

Besides the Charles Edgar Hoyt Annual Lecture by Harry W. Dietert on *"Processing Molding Sand," the* TRANSACTIONS include papers on zircon sands and olivine-silica sands; sand distribution received a reappraisal, as did the effect of moisture content on silica sand mixtures. Pressure molding with standard synthetic sands is discussed, the reason for core sand stickiness is explained, and the selection and mulling of synthetic sands and pH control of molding sand are covered.

Shell molding pattern equipment and shell molding research and recent developments are the subjects of three papers. Shell molding copper-base alloys is treated separately and shell molds are discussed in two papers on titanium practice.

Titanium practice is covered by papers on production, expendable molds, a new arc-type melting furnace, and surface contamination. Mechanical properties of titanium-aluminum alloys are also covered.

Gating and risering are treated in papers on vertical gating research (AFS sponsored), gating and risering of magnesium alloys, gating of yellow brass, and risering of nodular and gray irons.

Heat transfer characteristics of various molding materials for steel, shell molds, and foam plaster molds are presented in separate papers. Solidification of various metals in sand and chill molds and studies of chill action on steel to eliminate hot spots and on gun metal to improve pressure tightness are the subjects of other papers; also the importance of cooling rate on gray cast iron physical properties and the calculation of cooling times for castings after shakeout.

Melting operations are covered with the development of melting equipment and methods of melting cast iron borings and steel turnings; several papers are on air pollution control equipment. Electric furnaces are involved in papers on control of emissions, a special type for melting and pouring titanium, and control of melting atmospheres. Atmosphere control of annealing furnaces for blackheart malleable and the effect of pre-baking in malleablizing iron are aspects of heat treat as is the paper on the design and operation of a heat treat department for steel castings.

Graphitization of rims in malleable iron, magnesium-treated white irons, and certain Fe-C-Ti alloys are presented in three papers. Carbon or carbon form is related to machinability of cast irons, tensile and fatigue properties of gray iron and carbon equivalent and cast iron properties.

Presented also are the following subjects: metal penetration, casting surface standards, investment casting by the frozen mercury process and time study. Other papers are on calcium-carbide injection to desulphurize and upgrade cast iron physical properties and new aluminum and beryllium-magnesium die casting alloys.

The 1954 TRANSACTIONS, vol. 62, is an 8¼ x 11¼ in. case-bound volume of 680 pages including detailed subject and author indices. The 95 technical papers are profusely illustrated with photographs, drawings, tables, and graphs. AFS member price is $8.00; non-members, $15.00. Write to American Foundrymen's Society, Book Department, Golf & Wolf Roads, Des Plaines, Ill. Postage will be prepaid if remittance accompanies order.

Receives AFS Fifty-Year Service Pin

George Stewart, second from left, receiving his AFS 50-year service pin from Vince Bruce, center, Michiana Chapter Secretary, at the Marion Malleable Iron Works, Marion, Ind. Watching, from left, are William Irwin, pattern shop foreman, Larry Emery, metallurgist and Floyd DeHaven, plant engineer. Stewart was never fired from a job in 50 years and was only late for work twice and that was due to transportation.

Sand Technology Condensed In New Publication

PROCESSING MOLDING SAND, *the 1954 Charles Edgar Hoyt Lecture by Harry W. Dietert, Harry W. Dietert Co., Detroit, has been issued by AFS as a special publication. Profusely illustrated, this extensive review of the compounding, processing, and working of foundry sands, presents the contribution of sand technology to the improved quality of castings at the lowest possible cost.*

No longer limited to silica sand, the book indicates, foundrymen should consider the particular advantages of properly prepared base materials such as zircon, olivine, mullite, carbon sand, and chamotte (calcinated clay).

Mr. Dietert relates grain fineness, distribution, amount of fines, and clay content to the properties of blended sands. The addition of cellulose materials for cushioning and lowering hot strength is discussed along with the effect of other additives on hot properties.

Dustless seacoals, dustless pitch, and emulsified petroleum residue facings promise to improve working conditions, provide better finishes, and reduce cleaning costs, according to the author.

Effect of silica flour, olivine flour, fly ash, alumina flour, and iron oxide fines on sand strength properties is given.

Proposed Addition of Chemicals

Additions of chemicals as liquids or gases such as is common in magnesium sand practice are proposed for similar reasons for iron and steel practice. Slurry addition of additives besides reducing the dust, develop greater green strengths with less bond. Three slurry systems and four mechanisms for controlling bond additions are shown.

Dietert describes three sand cooling mechanisms and lists advantages besides reducing supervision requirements. Three types of continuous mixers are presented to aid in the selection of a machine with increased output. Recent development of automatic moisture determinators and automatic tempering units and combinations of both are discussed and related to continuous and batch mixing of sands.

Flowability and ramability properties are defined and related to methods of compacting molding sand. The author points out that considering molding sand a conductor of heat instead of an insulator makes data on conductivity applicable to sand and mold studies.

Mr. Dietert lists the savings possible through sand reclamation, and describes three reclamation systems. Modern sand technology demands chemical analysis control in addition to the highly developed physical controls now available, the new publication brings out.

Consists of pages, 8¼ x 11¼ in., and is illustrated throughout with diagrams, graphs, charts, and pictures. The book is available to AFS members for $1.50 and to non-members for $2.25. Writing to American Foundrymen's Society, Golf & Wolf Roads, Des Plaines, Ill. Postage will be prepaid if remittance accompanies order.

Shown during recess between Castings Clinic sessions are left to right: Wm. W. Maloney, general manager, AFS; Hans J. Heine, technical director; T. R. Clark, Omaha Steel Works; National Director J. T. Westwood, Jr., Blue Valley Foundry Co., Kansas City, Mo.; J. M. Buckholz, Dempster Mill Mfg. Co., Beatrice, Neb.; and Nate Levinsohn, Minneapolis-Moline Co., Minneapolis.

Vern Holmes, Paxton-Mitchell Co., Omaha

Stage First AFS Castings Clinic

FIRST CASTINGS CLINIC sponsored jointly by the AFS Technical Dept. and a chapter was held November 12 under the auspices of the Corn Belt Chapter at the Rome Hotel, Omaha. More than 75 foundrymen from four states gathered to participate in the technical discussions built up around the theme *Means Toward Better Castings*. Sessions in the morning featured Technical Director Hans J. Heine on gating and risering, casting design, and non-destructive testing and quality control. In the afternoon, separate discussions on ferrous and nonferrous casting problems were held. Closing session was devoted to literature, movies, bibliographies, and other material available through AFS.

Chairman of the Castings Clinic was Ira Trachtenbarg, Paxton-Mitchell Co., Omaha, assisting him were Vern Holmes and E. Clayton Ward of the same company.

The Castings Clinic opened with James L. Paxton, Jr., Paxton-Mitchell Co., honorary chairman of the clinic, emphasizing the support management is giving to AFS efforts to make available information which will help foundrymen solve their technical problems.

Castings Clinics can be set up by any chapter or group of chapters in cooperation with the AFS Technical Dept. Sessions will be tailored to meet local needs; prototype staged in Omaha was developed to cover in a single day the industry's major current problems. To organize a Castings Clinic, write: Hans J. Heine, Technical Director, American Foundrymen's Society, Golf & Wolf Roads, Des Plaines, Ill.

Technical Director Heine started the technical sessions with a discussion of casting design fundamentals illustrated by a number of current examples of good design. He stressed the importance of redesign to production of better castings, to product development, and to conversion of non-cast parts to castings.

In the second session, Mr. Heine presented fundamentals of good gating design, then showed color-sound motion pictures of AFS-sponsored research illustrating the effect of gating design on casting quality.

In the final morning session, Heine called attention to the non-destructive test techniques available to foundrymen and their use in production of better castings. Brittle lacquer and strain gauge methods of experimental stress analysis were explained briefly, and a series of slides was shown depicting typical applications of x-rays, Co-60, and gamma ray sources. Also covered was the importance of a quality control program.

During lunch, AFS National Director J. T. Westwood, Jr., Blue Valley Foundry Co., Kansas City, Mo., and General Manager Wm. W. Maloney spoke on AFS activities and services, and stressed the importance to the industry of a continuous flow of technical information.

The afternoon session opened with a talk by Nate Levinsohn, Minneapolis-Moline Co., Minneapolis. He discussed at length his four-point program for scrap reduction: 1. Good supervisors; 2. An alert metal department; 3. An integrated quality control program; and 4. Sound gating and risering practice. A number of defective castings formed the basis for discussion of preferred production techniques by the audience.

Non-ferrous casting problems were covered in the following session.

Publications table and refreshment table vied for attention during coffee break. On display, in addition to the numerous AFS publications, were recent talks by Technical Director Heine and especially prepared Clinic text material. Text and talks were free.

News of Technical Committees

Recent Committee Meetings

Research Committee, Brass & Bronze Div., Ann Arbor, Mich., Sept. 30

Industrial Engineering Committee, Chicago, Oct. 1

Research Committee, Brass & Bronze Div., Washington, D. C., Oct. 4

Basic Concepts and Flowability Committees, Sand Div., Chicago, Oct. 8

Research Committee, Malleable Div., Madison, Wis., Oct. 15

Research Committee, Steel Div., Chicago, Oct. 15

Refractories Committee, AFS Technical Center, Des Plaines, Ill., Oct. 18

Research Committee (8-J), Sand Div., Rockton, Ill., Oct. 21-22

Research Committee, Gray Iron Div., Chicago, Nov. 3

Air Pollution Control Committee, Detroit, Nov. 3

Shop Operation Course Sub-Committee, Gray Iron Div., East Lansing, Mich., Nov. 12

Core Test Committee and all sub-committees, Sand Div., Cleveland, Nov. 22-23

Joint Committee on Foundry Vocational Training, Educational Div., AFS Technical Center, Des Plaines, Ill. Dec. 17

Basic Concepts Committee, Sand Div., Chicago, Jan. 21

Research Committee 8-J, Sand Div., Ann Arbor and Detroit, Jan. 24-28

Meeting Reports

Light Metals Executive. Chairman Manley E. Brooks, Dow Chemical Co., Bay City, Mich., presided over the meeting held at the Hotel Sherman, Chicago, Aug. 18. Discussion of preparations for the Light Metals sessions of the Houston Convention was led by E. V. Blackmun, Aluminum Co. of America, Garwood, N. J.

Steel Research. Chairman Clyde H. Wyman, Burnside Steel Foundry Co., Chicago, opened the meeting at the Hotel Sherman, Chicago, Aug. 27, by reviewing comments on the Hot Tear Project interim report. The Committee discussed the progress report of J. Dvorak, Armour Research Foundation, Chicago, on the work at Armour.

"Flushing of Cast Steel with Gases" was approved as a new cooperative research project. It is proposed that at the start a commercial hydrogen-carbon-fluorine gas-forming compound be introduced with argon as a carrier into class B steel and cast into A.S.T.M. test bars. All test castings will be normalized only, by Burnside Steel. Impact tests will be conducted at room temperature and at —40 F.

Sand Shop Course. The meeting was called to order at the Hotel Sherman, Chicago, Sept. 2, by Chairman R. H. Olmsted, Whitehead Brothers Co., New York. The committee decided to hold two shop course meetings at the Houston Convention. The first session will bring out, by example, the best methods of organizing sand control for various sizes and types of shops. Questions to be answered are: Who should be in charge of molding materials? How many operators per shift are needed? How often do you test, and for what? How do you get the molding department's cooperation? What are the benefits of sand control? How far do you go with testing?

The second session will stress cost advantages of automatic sand preparation, including tempering, bond additions, mulling time, and distribution. The effect on man hours, molds lost, casting quality, and scrap will be evaluated.

Sand Executive and Programs & Papers. Chairman Frank S. Brewster, Harry W. Dietert Co., Detroit, presided over the combined meeting at the Hotel Sherman, Chicago, Sept. 3. O. J. Myers, Archer-Daniels-Midland Co., Minneapolis, led the discussion of the plans for the Houston Convention. Chairman of the six scheduled and two tentative sand sessions will be from the Houston area and tape recordings will be made of all sessions, the committee decided.

After discussing the work to be done by each research group, it was concluded that the Sand Div. should consider both practical and theoretical approaches to problems. It was decided to discontinue the Core Strength Sub-Committee and assign its duties to the Core Test Committee.

The Nomenclature and Terminology Committee, having completed its work, was dissolved. Clyde A. Sanders, American Colloid Co., Chicago, will select from that group members for the Sand Handbook Revision Committee. Sanders was further empowered to appoint an editorial committee and make assignments for individual chapters of the proposed book.

Sand Executive, Flowability, and Basic Concepts. C. E. Wenninger, National Engineering Co., Chicago. Chairman of the newly formed Basic Concepts Committee opened the joint meeting at the Hotel Sherman, Chicago, Oct. 8. In discussing the future of sand research it was pointed out that there is a need for popularizing fundamental industrial research involving the use of working hypotheses to guide research.

The significance of the crossing point of the expansion and deformation curves for predicting scabbing tendencies was stressed by Henry W. Meyer, General Steel Castings Corp., Granite City, Ill., chairman of Committee 8-L, in reviewing work just completed at Cornell University.

V. M. Rowell, Archer-Daniels-Midland Co., Cleveland, discussed the application of his pocket flowability test device. Upon Mr. Wenninger's resignation as chairman of the Flowability Committee, Mr. Rowell was elected to fill the post.

Refractories. Chairman Walter R. Jaeschke, Whiting Corp., Harvey, Ill., opened the first technical meeting to be held at the new AFS Foundry Technical Center, Des Plaines, Ill., on Oct. 18. The entire meeting was devoted to review of progress made on the manual for foundry refractories and to the assigning of specific sections and chapters to individuals.

The manual will include fundamentals, manufacture and tests of refractories and a glossary of refractory terms; also applications of refractories in melting furnaces: air, converter, crucible, cupola, direct and indirect arc and induction electric, open flame, and open hearth. In addition the use of refractories in forehearths, ladles, and heat treating furnaces is to be covered. A section is devoted to pouring tiles, break-off cores, skim or strainer cores, and insulating pads and risers.

Research Committee 8-J. Chairman Robert L. Doelman, Miller & Co., Chicago, presided over the meeting at the Wagon Wheel Lodge, Rockton, Ill., Oct. 22-23. Papers by Roy Korpi, Ford Motor Co., Dearborn, Mich., on *"Veining of Cores—Cause and Detection,"* R. E. Wilke, American Radiator & Standard Sanitary Corp., Louisville, Ky., on *"The Scab Defect on Gray Iron Castings,"* and Victor M. Rowell, Archer-Daniels-Midland Co., Cleveland, on *"Evaluation of Core Knockout"* were read, amended, and endorsed for publication in AMERICAN FOUNDRYMAN.

The committee broke up into smaller groups which studied data previously obtained at a work session on scabbing tendency research.

A work meeting was scheduled for Jan. 24-28 with molding and pouring at the University of Michigan and sand testing at the Harry W. Dietert Co. (Detroit) laboratory.

New Committee Roster Issued

The 1954-55 roster of AFS national committee personnel has been issued to all committee members and to sustaining and company members of the Society. Listed are over 600 men who are contributing their time, knowledge, and experience to promote the technology of cast metals. Also shown are the eight divisions made up of the specific interest committees, and the general interest committees that cut across the fields of the various alloys.

The national committee personnel listed compile the various AFS publications from collective ideas and experiences; conduct fundamental and applied research cooperatively among themselves and the companies with which they are associated; administer and guide research contracted with technical research centers; and solicit and review technical papers for presentation before the technical sessions of the Annual AFS Convention.

C. R. Culling . . . . . reviews program

R. L. Gilmore . . . . . product developer

H. L. Edinger . . . . . G.I.F.S. medalist

Gray Iron Founders Look to Markets

HERBERT F. SCOBIE/*Editor*

INSURANCE, markets, and product development highlighted the 26th annual meeting of the Gray Iron Founders' Society November 11 and 12 at the Homestead, Hot Springs, Va. Presiding throughout the meeting was Henry J. Trenkamp, Ohio Foundry Co., Cleveland, who was completing his second year as president of G.I.F.S.

Elected to office for the coming year were: president, C. H. Ker, Dalton Foundries, Inc., Warsaw, Ind.; vice-president, J. W. Simmons, Jr., Cox Foundry & Machine Co., Atlanta, Ga.; secretary, C. H. Meminger, Posey Iron Works Inc., Lancaster, Pa.; and re-elected treasurer, W. O. Larson, W. O. Larson Foundry Co., Grafton, Ohio.

Directors elected for three-year terms are: Albert M. Nutter, E. L. LeBaron Foundry Co., Brockton, Mass.; W. E. Illig, Banner Iron Works, St. Louis; E. T. White, Bostick Foundry, Lapeer, Mich.; and incumbent Robert G. Schaefer, Schaefer-Goodnow Foundries, Inc., Pittsburgh, Pa.

Reappointed executive vice-president was Donald H. Workman.

New officers and directors were announced at the luncheon closing the meeting. Other features of the luncheon included presentation of citations and awards for industry and society service, and prizes for winners in the 1954 Redesign Contest. H. L. Edinger, Barnett Foundry & Machine Co., Irvington, N. J., was honored with the G.I.F.S. Gold Medal for serving the organization as president, vice-president, and director as well as chairman of the Gray Iron Industry Advisory Committee to the government's pricing agency in World War II.

Citations for unusual service to G.I.F.S. were presented to W. O. Larson, E. M. Knapp, Ferro Machine & Foundry, Inc., Cleveland, John E. McIntyre, Sibley Machine & Foundry Corp., South Bend, Ind., and W. A. Morley, Olney Foundry Div., Link-Belt Co., Philadelphia.

Officers and directors of G.I.F.S. in session during annual meeting. Seated, left to right, are: Summerfield Brunk; Donald H. Workman, executive vice-president; Henry J. Trenkamp, retiring president; C. H. Ker, incoming president; W. O. Larson, treasurer; E. L. Roth. Standing, left to right, are: Robert G. Schaefer; E. T. White; W. E. Illig; Albert M. Nutter; G. L. Nimocks; E. M. Knapp; J. C. Alberts; and C. H. Meminger, incoming secretary.

Wm. S. Thomas, Emmaus Foundry & Machine Co., Inc., Emmaus, Pa., won first prize in the Redesign Contest. Russell W. Henke, Badger Meter Mfg. Co., Milwaukee, took second place; Paul C. Nelson, O'Neil-Irwin Mfg. Co., Lake City, Minn., was third. Honorable mentions were: L. R. Kells and C. Hempfing, R. H. Sheppard Co., Inc., Hanover, Pa.; C. W. Gilchrist, Cooper-Bessemer Corp., Mount Vernon, Ohio; J. J. Laudig, Delaware, Lackawanna & Western Railroad Co., Scranton, Pa.; Paul B. Dinkel and Peter Dudyak, Eberhard Mfg. Co., Cleveland; and A. J. Schnipper, Excelsior Foundry Co., Belleville, Ill.

The luncheon meeting concluded with Martin R. Gainsbrugh, National Industrial Conference Board Inc., New York, pointing out that business has had a mild recession and in all likelihood will have a mild recovery. The 10 per cent drop in physical output of industry of the past 18 months has reached bottom and has turned upward, he said, while the value of the gross national has fallen only 4 per cent.

Looking ahead, Mr. Gainsbrugh saw an increase of several per cent in the value of the gross national product and a 5 to 8 per cent increase in the Federal Reserve Board Index of Industrial Production during 1955. Automobiles will be as good or better in 1955 than in 1954, he predicted.

The annual meeting opened with reports by G.I.F.S. President Trenkamp and Treasurer Larson. Executive Vice-

President Workman said in his report that scrap export permits now amount to 1,650,000 tons despite industry protests and that Gray Iron Founders would continue to protest the unreasonable loss of ferrous metals. Expressing cautious optimism for 1955, he pointed out that production of gray iron castings approximated a million tons a month in the last quarter of 1954; capacity is about 20 million tons a year, he said.

C. F. Walton, technical director of the society, outlined his activities in preparing publications, handling inquiries, and participating in committee work of AFS, and specification-making bodies such as A.S.T.M. and A.S.M.E.

C. R. Culling, Carondelet Foundry Co., St. Louis, presented an extensive report as chairman of the Program Evaluation Committee, set up to serve in an advisory capacity to G.I.F.S. officers and directors. He commented on current and future activities in costs, technical work, product and market development, dues structure, publicity and promotion, and membership.

Speaker at luncheon the first day was Wendell B. Barnes, administrator, Small Business Administration, Washington, D. C. He listed the three principal responsibilities of SBA as: to help small business concerns gain access to adequate capital and credit; to assist them in obtaining a fair share of the government's orders for goods and services; and to help them obtain competent management, technical, and production counsel. Greatest demand has been for counsel on financial problems and assistance in obtaining working capital.

A panel discussion on insurance had P. E. Rentschler, Hamilton Foundry & Machine Co., Hamilton, Ohio, as moderator. James O. Honeywell, New Amsterdam Casualty Co., Baltimore, Md., spoke on product liability insurance; George V. Whitford, Fire Association of Philadelphia, Philadelphia, spoke on bailee legal liability insurance.

The old warning "let the buyer beware" has now become "let the seller beware," Mr. Honeywell said. He told how manufacturers and vendors can protect themselves with product liability insurance against suits based on negligence or breach of warranty (stated or implied). Mr. Whitford discussed insurance on patterns in custody of a foundry.

Meetings the second day were devoted to market research and product development. N. R. Ladabouche of *Steel* spoke on *"Markets Are Where You Find Them."* He described an analysis of castings shipments for the past seven years showing that each branch of the castings industry has retained its proportionate share of castings business. Most serious problem, he said, is competition from non-cast products. He advised stepping up selling by preparing a good customer and prospect list, finding new applications for castings, advertising, adding new lines, and price competition based on more efficient production methods.

Ross L. Gilmore, Superior Steel & Malleable Castings Co., Benton Harbor, Mich., presented a talk entitled *"Increasing Your Sales Through Product Development."* There is no engineering substitute for metal castings, he said in stating that there is no way of putting metal where you want it so effectively and so economically as by casting. Product development can be carried on at both plant level and at society or industry level, he said. Projecting experience of the Steel Founders' Society of America, whose Product Development Committee he heads, Mr. Gilmore said members of G.I.F.S. had a business potential of $85,000,000 in new business through conversions to gray iron castings.

Loss of a market, Gilmore said, is usually due to quality or cost. Numerous tools for measuring quality are available to foundrymen, and they should learn to take advantage of them, he said. Product development is not a highly technical nor mysterious operation, he indicated and suggested that probably all foundries carry it on informally to some extent. Superior Steel & Malleable has one engineer, one technician, and one draftsman and three work areas: drafting room and office, model preparation room, and space for static and dynamic testing.

Speaker before the final luncheon was Paul W. Vandenberg, Crane Co., Chicago, chief of the Castings Section, Business & Defense Service Administration, Washington, D. C. He commented briefly on the functions of his department and stated that there was a great need for educating military engineers to the value and usefulness of castings.

CASTING through the Ages
AFTER THE REVOLUTIONARY WAR, PAUL REVERE, FAMED BELL-AND-FITTINGS FOUNDER AND PATRIOT EXPERIENCED TROUBLE WITH HIS BOSTON NEIGHBORS WHO OBJECTED TO THE SMOKE CAUSED BY HIS FOUNDRY-FURNACE FIRES.
THE SUCCESSORS OF Abraham Darby AND HIS ASSISTANT JOHN THOMAS, WERE ABLE TO KEEP SECRET FOR NEARLY A CENTURY THE METHOD THEY DEVISED IN 1709 OF MOLDING IRON COOK POTS IN A NEW TYPE OF FLASK
Cannon CAST FOR USE IN THE WAR OF 1812 ENDED THEIR DAYS AS HITCHING POSTS ALONG PHILADELPHIA AVENUES
Odd Bits
BEFORE THE MID 15th CENTURY ADVENT OF TRUE CAST IRON PIPE, PIPE LINES OF IRON WERE MADE BY PLACING CANNON END TO END AND JOINING THEM ... TO-GETHER!

YELLOWSTONE

THE SUPERIOR SAND BONDING AGENT

Molding sands containing Yellowstone Western Foundry Bentonite have been proved in test after test to have greater green strength and higher permeability. Only a small amount of Yellowstone is required because of its great strength. The superior bonding characteristics permit the use of smaller amounts of bond and less water to temper. For better casting finish and less casting defects Yellowstone is your answer.

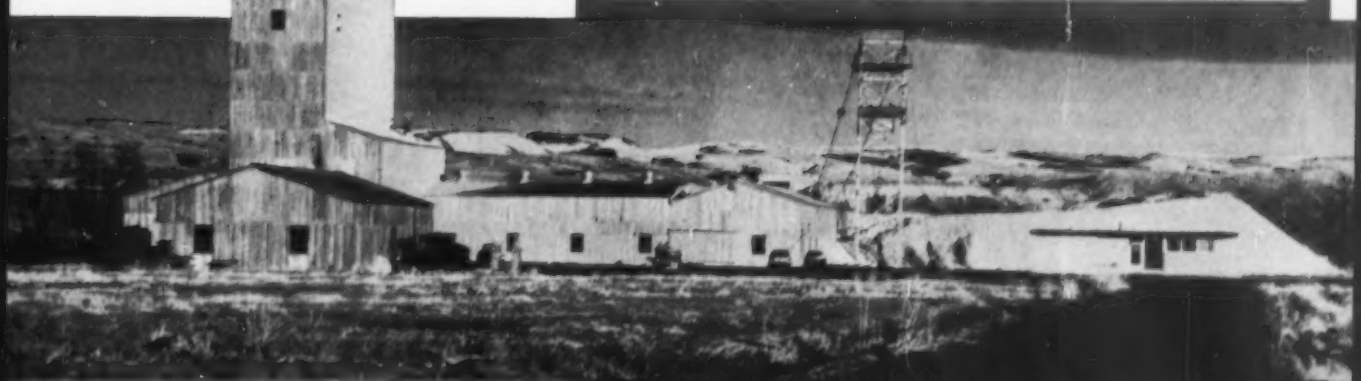
This superior performance is a result of Yellowstone bentonite being selected from the finest deposits of colloidal bentonite at the Yellowstone mines at Greybull, Wyoming. A stockpile containing in excess of 200,000 tons and special processing equipment in the world's most modern bentonite plant guarantee uniform quality in every bag of Yellowstone.

Ask your distributor for Yellowstone Western Foundry Bentonite.

Comparative tests by an independent research laboratory* prove Yellowstone's superiority. Tests were made with an added clay content of 5%.

	GREEN PROPERTIES (a)						DRY PROPERTIES (b)	
	pH	Green Compressive Strength psi	Permeability AFS Units	Toughness psi (c)	Deformation in./in.	Hardness (d) AFS Units	Compressive Strength psi	Permeability AFS Units
Yellowstone	9.4	16.1	107	145	0.008	92	66.5	115
Western Bentonite A	8.9	12.5	92	149	0.011	86	64.3	109
Western Bentonite B	9.3	15.5	86	134	0.009	85	76.4	102
Western Bentonite C	9.7	12.9	95	136	0.011	88	29.0	109

(a) Standard AFS Procedures.
(b) Oven dried 2 hours at 220F to 230F.
(c) Product of green compressive strength (psi) and deformation (inches per inch).
(d) Hardness measured on bottom of rammed specimen.
*Name on request.



THE WORLD'S MOST MODERN BENTONITE PLANT

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Foundry Tradenews

Gerwin Industries, Inc., has appointed **RAJAC Sales Equipment Corp.,** Lincolnwood, Ill., as exclusive sales representatives for Whirl-Air-Flow (pneumatic pipeline conveyor system for moving foundry sand).

A New York district office has been opened by **Mechanical Handling Systems, Inc.,** Detroit manufacturer of conveyors and materials handling equipment. The office will be located in Englewood, N. J.

The sales-engineering firm of John T. Couchman Co., Indianapolis, is now **Couchman-Conant, Inc.,** as Alan Conant joins the organization.

The **A. R. Ryan** organization has been appointed as field sales representative for **Buckeye Tools Corp.,** Dayton, Ohio. The Ryan concern will service Louisiana, Mississippi, Western Florida and lower Alabama.

Completion of a new leaching system marks the end of the second construction phase at the Riverton, Minnesota plant of **Manganese Chemicals Corp.,** Minneapolis.

G. A. Conger and R. L. Sonnenberg have recently formed a new company called **C & S Products Co.,** which designs, manufactures and sells shell core and mold blowing equipment. The firm will have its office in Detroit.

Kaiser Aluminum & Chemical Sales, Inc., has appointed **Erin Metals Corp.,** Detroit, as distributor of Kaiser Aluminum ingot in the Detroit trading area. Erin Metals is a newly incorporated firm in which officers and personnel are largely metallurgical engineers.

Caldwell Co., Rockford, Ill., is now **Caldwell Co., Inc.** Officers are: L. M. Caldwell, president; Harold Hildebrand, vice-president; J. W. Hallock, secretary; and M. W. Woolf, treasurer.

Bulletins 150 and 151, produced by **Shenango-Penn Mold Co.,** Dover, Ohio, cover centrifugally cast parts for use as bushings, liners, sleeves, rings, rolls, or many other symmetrical or annular shape. Bulletin 150 deals with nonferrous parts in manganese and aluminum bronzes, red bronzes, brass, high nickel, and special alloys. No. 151 covers ferrous parts of inoculated cast iron, heat and corrosion resistant and special iron alloys. Write to the company for these publications.

Addition of an Adhesives Division has been announced by **Carboline Co., Division of Mulines Non-Ferrous Castings Co.** The new division will specialize in research and development of adhesive products for specific uses. Both companies are in St. Louis.

Kaiser Aluminum & Chemical Corp.'s Chalmette, La., reduction plant has passed the half-billion lb mark in the pouring of primary aluminum. Works manager L. A. Amos called this a significant milestone in the history of the nation's largest primary aluminum plant.

Continental Foundry & Machine Co. will build a number of hulls, machine all hulls and cast and machine turrets for the Army tanks in a $160,000,000 armor contract awarded Chrysler Corp. All three Continental Foundries, Pittsburgh Works at Coraopolis, Pa., East Chicago, Ind., and Wheeling, W. Va., will be engaged in the program.

Somerville Machine & Foundry Co. Somerville, Mass., recently announced the completion of a new 100,000-foot addition to the Somerville plant. As a result of the addition, a 25% increase in work capacity will be possible.

Donaldson Power Ventilator Co. has enlarged its facilities in North Hollywood, Calif.

Norton Co. Worcester, Mass., will add to its electric furnace capacity by building a new plant in Huntsville, Ala. This expansion will be located on a 100-acre site in an area known as Hobbs Island along the north bank of the Tennessee River. The ground will be broken late this year with completion expected by the end of 1955. The total cost of this project is estimated to be $1,250,000.

Foxboro Co. Foxboro, Mass., has officially opened a new instrument service and assembly building in San Leandro, Calif. The new factory has more than doubled the company's West Coast manufacturing facilities, providing 8400 square feet of space for the service, production and sales departments.

Eaton Manufacturing Company's Foundry Div., Detroit, has published a 4-color, 8-page bulletin on permanent mold gray iron castings for refrigeration, power steering, washing machines, power braking, v-belt pulleys, and hydraulic controls.

Electro Metallurgical Co., Div. of Union Carbide and Carbon Corp., announced that its Cleveland District Office will be located at the Union Carbide and Carbon Building, 1300 Lakeside Ave., Cleveland 14, Ohio.

Lester Engineering Co., Cleveland, has purchased Phoenix Machine Co. The purpose of the purchase is to increase production and ultimately reduce the cost of the equipment through expanded facilities and improved production methods. As a result of the purchase, engineering, production and sales are now integrated under the same management. Lester-Phoenix Inc., the sales agency for the company, will continue under the name as a wholly owned subsidiary.

Lebanon Steel Foundry, Lebanon, Pa., has announced publication of a new 12-page brochure on centrifugal castings. The new brochure, the most complete ever published by Lebanon Steel Foundry on this process, is printed in two colors and contains about thirty photographs and illustrations.

Precision Castparts Corp., first investment casting firm in the Northwest, has announced the addition of complete shell molding facilities in its Portland, Ore. plant. The Portland plant has complete facilities for producing quality castings by either the shell molding or investment casting processes from ferrous, non-ferrous and alloy materials in any quantity of units up to ten pounds in weight. To assist customers in adapting these processes to their products, the firm offers the services of an experienced engineering department, a complete tool and die shop, inspection and finishing departments, and a well staffed and equipped metallurgical laboratory.

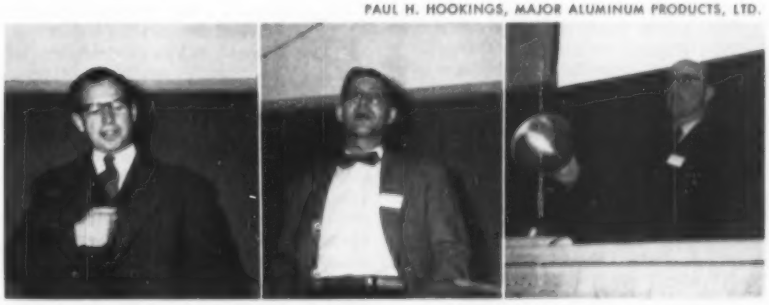
FRED R. YOUNG, E. A. WILCOX CO.

Standing from left to right at the head table of the Northwest Regional Conference banquet are: Prof. James W. Smith, Oregon State College; Oregon Chapter Chairman Phillip J. Laugen, Oregon Steel Foundry Co.; AFS National Director G. Ewing Tait, Dominion Engineering Works, Ltd.; Dean H. Goard, Vancouver Vocational School; AFS President Frank J. Dost, Sterling Foundry Co.; Conference Chairman S. James Hatchett, Canada Metal Co., Ltd.; Dr. James G. Parr, University of British Columbia; British Columbia Chapter Chairman Howard H. Havies, Vivian Diesels & Munitions, Ltd. Dinner speaker was Dr. Parr and his subject was "*Blood and Sand*".

Northwest Founders Meet in Vancouver

JAMES T. HORNBY / *Sales*
Balfour Guthrie (Canada) Ltd., Vancouver, B. C.

PAUL H. HOOKINGS, MAJOR ALUMINUM PRODUCTS, LTD.



Northwest Regional Conference technical speakers included, left to right: Prof. William M. Armstrong, University of British Columbia; J. E. Rehder, Canada Iron Foundries, Ltd.; T. R. Stanley, Consolidated Mining & Smelting Co. of Canada, Ltd.

THE FIFTH ANNUAL Northwest Regional Foundry Conference at Vancouver, British Columbia, October 15 and 16 was attended by 190 foundrymen and their ladies. Sponsoring chapters were the Oregon, Washington, British Columbia Chapters and the Oregon State College Student Chapter. The conference was held in cooperation with the University of British Columbia.

S. James Hatchett, Canada Metal Co., Ltd., Vancouver, was chairman of the General Organizing Committee; Lovick P. Young, A1 Steel & Iron Foundries, Ltd., Vancouver, was the secretary-treasurer in charge of finance, and William R. Holeton, Vancouver, was in charge of the technical program and speakers. Technical sessions on steel, iron, nonferrous, and light metal subjects and non-destructive testing were held at the university on the 16th.

Chairman of the morning sessions was Prof. William M. Armstrong, University of British Columbia; speakers were T. R. Stanley, Consolidated Mining & Smelting Co. of Canada, Ltd., Trail, B. C., on "*Manufacture of Steel Pots for Metal Processing,*" and J. E. Rehder, Canada Iron Foundries, Ltd., Montreal, Que., on "*Cast and Nodular Irons.*"

Mr. Stanley described the procedures used at his plant to cast massive steel metal-processing pots, using models to illustrate methods of overcoming casting problems. Mr. Rehder proposed methods for reducing costs while at the same time producing castings of better quality. He pointed out advantages and disadvantages of water-cooled, basic-lined cupola operations. In closing, Rehder stated that control of foundry operations must exist from the scrap heap to the finished product.

Prof. Frank Forward, head of mining and metallurgy, University of B. C., welcomed conferees to the campus at luncheon.

A. E. Cartwright, Crane Ltd., Montreal, Que., speaking on "*Some Reflections on and Experiences in Melting and Pouring Bronze,*" described remedies for the hazards of brass and bronze practice. (EDITOR'S NOTE: Entire paper appears in this issue, pages 50-56.) Paul H. Hookings, Major Aluminum Products, Ltd., Vancouver, spoke on "*Practical Application of Fluid Flow to Gating and Risering Aluminum Alloy Castings.*" Chairman of the afternoon sessions was Thomas Cowden, William McPhail & Sons, Canada, Ltd., Vancouver.

Dr. P. J. Stewart, Radiography Div., Isotope Products Ltd., Oakville, Ont., spoke on "*Non-Destructive Testing of Steel and Castings Using Radioactive Materials.*" Dr. Stewart described isotopes and explained how they are made in atomic reactors such as the Canadian pile at Chalk River. He said the advantages of using cobalt 60 and similar isotopes for engineering inspection are that they have the advantages of radium along with the speed of x-ray and, in addition, have adaptability which radium lacks. Dr. Stewart predicted shorter exposure times and choice of penetration and resolution power for different sections and metals with the development of new isotopes with different characteristics.

General Chairman Hatchett welcomed members and guests to the conference at the dinner Friday evening. AFS President Frank J. Dost, Sterling Foundry Co., Wellington, Ohio, brought greetings from the officers and directors of the Society and reviewed the organization's activities and services. Oregon

continued on page 95

Between sessions at the New England Regional, left to right, are: Henry G. Stenberg, Draper Corp., Hopedale, Mass.; Albert M. Nutter, E. L. LeBaron Foundry Co., Brockton, Mass.; and Alexander Beck, Whitman Foundry, Inc., Whitman, Mass.

Hold New England Regional Meeting

H. F. SCOBIE / *Editor*

Assisting in reporting the 1954 New England Regional Foundry Conference were George Liff, Klein-Farris Co., Boston, and Bernard J. Klim, chairman of the AFS Student Chapter of Massachusetts Institute of Technology.

THE 14TH New England Regional Foundry Conference was held at Massachusetts Institute of Technology, October 29-30, under the sponsorship of the New England Foundrymen's Association, MIT, the MIT Student Chapter of AFS, and other groups representing the foundry and metalworking industries. Combining 13 sessions in a program with a number of simultaneous sessions for ferrous foundrymen, the meeting was under the general chairmanship of Joseph B. Stazinski, General Electric Co., Everett, Mass.; Henry G. Stenberg, Draper Corp., Hopedale, Mass., was vice-chairman. Program was under the direction of Ahti Erkkinen, B-I-F Industries, Inc., Providence, R. I., ferrous, and Stafford W. Chappell, Jr., General Dynamics Corp., Groton, Conn., non-ferrous.

Exercise ingenuity and stay in business, Mr. Stazinski said, in opening the conference. Prepare for difficult times by tackling tough jobs when times are good so you'll know the answers when times are not so good and you can't afford to be so selective in accepting orders, he advised, in urging foundrymen to make the most of the conference sessions. C. Richard Soderberg, dean of engineering, welcomed the conference to MIT.

Three speakers appeared at the first session—*"Evaluation of Molding Methods."* Speakers were: shell molding—F. E. Murphy, Walworth Co., South Boston; D process—Frank S. Brewster, Harry W. Dietert Co., Detroit; and pressure molding—Thomas E. Barlow, Eastern Clay Products Dept., International Minerals & Chemical Corp., Chicago.

Mr. Murphy described shell molding at his company to emphasize the possibilities for mechanization which he gave as a major advantage of the C process. Mold making is on a completely automatic eight-spindle, hydraulic-action machine. Other advantages, he said, are the high permeability of the shell, decreased risering and gating required, smoother finish and less finish allowance needed, easier chucking in the machine shop, and possible indefinite mold storage. Shell molding gives a cleaner foundry with better working conditions but its mechanization on a scale such as exists at Walworth requires a large production volume, he indicated.

Mr. Brewster advised getting the most out of green sand practice before adopting special mold-making techniques, in prefacing his remarks on the D process, a procedure for making shell mold sections by blowing a special core sand mixture between a pattern and a contour drier. The D shells can be clamped mechanically because they are rigid and have a hard back. This keeps dimensional variations across the parting line to 0.015 in., he said. D shells can be blown through the contour drier onto a hot pattern, and for short runs the sand mixture can be rammed by hand over a wood pattern, he declared. (EDITOR'S NOTE: Complete story on the D process appears in the August issue of AMERICAN FOUNDRYMAN, pages 56-65).

Mr. Barlow said pressure molding was based on the principle of getting high density in the mold using fine sand of high flowability, and high pressure. While some work has been done at pressures of 500-600 psi, he stated, most is now done around 100 psi. Patterns are particularly important at higher than normal pressures because the mold reproduces small details such as nicks and punch marks, and is especially sensitive to slight backdrafts. A big molding machine and a small pattern will give "pressure" molding, Barlow said.

Difficulties arise when the pattern is deep and pressures are difficult to convey to all faces of the pattern. This is overcome, according to the speaker, by using equipment which applies pressure by means of rubber diaphragm that exerts force more directly toward the pattern.

Robert C. Walker, Whitin Machine Works, Whitinsville, Mass., was chairman of the morning technical session.

Ferrous sessions the afternoon of the first day had as speakers Clyde A. Sanders, American Colloid Co., Chicago, and Lester B. Knight, Lester B. Knight & Associates, Inc., Chicago. Chairman of the first session was N. Paul Benson, Pioneer Foundry & Mfg. Co., Gilbertville, Mass.; co-chairman was D. Wesley Case, Detroit Control Corp., Belknap Mfg. Works, Bridgeport, Conn. James P. Robinson, United Shoe Machinery Corp., Beverly, Mass., was chairman of the second session, with Roy E. Hayward, Draper Corp., Hopedale, Mass., as co-chairman.

Mr. Sanders discussed casting defects caused by factors not related to sand and pleaded for more help for foundry supervision to prevent careless, foolish errors being made. He urged using the best possible flasks, patterns, and molding equipment.

The market for castings is on the increase, Mr. Knight said, in introducing his subject, *"Materials Handling."* Castings production poses a problem in materials handling plus control and it is important to achieve the minimum of manual handling and the maximum productivity. Some foundries don't operate as profitably as they should because they don't know their costs, he stated. Where good cost practices are established, some foundries refuse to accept orders for castings they can't produce profitably or which they aren't equipped to handle.

In discussing selling, Knight declared that it is not enough to sell conversion of metal alone, but is important also to sell a part that's best for a given application. A place exists for the small and medium job shop even without mechanization, he pointed out, although he advised motorizing to the Nth degree. Mechanization of a portion of a plant should pay for itself in three years, he concluded.

First day's non-ferrous sessions featured William Romanoff, H. Kramer & Co., Chicago, speaking on *"Brass and Bronze Foundry Practice for Pressure Casting,"* and Charles Batchelder, Charles Batchelder Co., Inc., Botsford, Conn., whose subject was *"Practical Aspects of Aluminum and Aluminum Alloys."* At the brass and bronze session, William Stone, Victor Foundry, Guilford, Conn., was chairman; Stafford W. Chappell, Jr.,

was co-chairman. Louis Penkoff, Peerless Aluminum Foundry, Bridgeport, Conn., was chairman of the aluminum session, and Owen Johnson, H. B. Ives Co., New Haven, Conn., was co-chairman.

After reviewing the discovery and development of production methods for aluminum, Mr. Batchelder discussed selection of alloys, and foundry practice. He advised against using an available alloy because it happens to be on hand, instead of selecting the best alloy for the job. Don't use a copper-bearing alloy where good corrosion resistance is required, he warned.

Discussing melting, Batchelder recommended use of a reduced pressure porosity detector to test effectiveness of degassing procedure. No foundry should operate without one, he said, after describing how the one minute test in which a small crucible of molten metal freezes in a vacuum is carried out. Main factor in any foundry is gating practice, he said. To prevent shrinkage, he gave two simple rules: feed it and chill it. Use of sand testing equipment for controlling molding and coremaking mixtures is of the utmost importance, the speaker stated.

Mr. Stazinski presided at the conference banquet. Bruce L. Simpson, National Engineering Co., Chicago, AFS vice-president, offered the cooperation of AFS in future activities of the New England group. Toastmaster was Prof. Howard F. Taylor, MIT; principal speaker was Gerry Moore of the Boston *Post* who appeared through courtesy of Mystic Iron Works and New England Coke Co.

The second day started off with a joint session at which Kenneth G. Yost, National Metal Trades Association, Chicago, discussed human relations in a talk entitled *"Total Power."* He was introduced by Frank A. Benoit, Jr., Brown & Sharpe Mfg. Co., Providence, R. I. Session co-chairman was Harry K. Sleicher, Seaboard Foundry, Inc., Providence, R. I.

Prof. Taylor described briefly the foundry training program and facilities at MIT. In addition to the formal courses, he told how some 15 to 50 students work on Saturdays in the foundry laboratory, planning and performing all their work with a minimum of direction from the staff. He emphasized the value to industry of showing the students that industry is interested in them, and invited foundrymen to attend student functions such as meetings of the MIT Student Chapter of AFS.

Howard Nye, Crompton & Knowles Loom Works, Worcester, Mass., was chairman of the session on MIT foundry training.

Three ferrous and three non-ferrous sessions rounded out the two-day program. Following are the ferrous sessions:

"Reducing Cleaning Costs in a Jobbing Foundry," C. W. Mooney, Jr., Olney Foundry, Link-Belt Co., Philadelphia; chairman—Joseph T. Burke, Lowell Iron Foundry, Inc., Lowell, Mass.; co-chairman—Samuel Camack, General Electric Co., Lynn, Mass.

"Cupola Practice," Walter R. Jaeschke, Whiting Corp., Harvey, Ill.; chairman—William Keown, Warren Foundry & Pipe Corp., Everett, Mass.; co-chairman—Romeo J. Lemoine, Fitchburg Foundry, Inc., Fitchburg, Mass.

"Casting Clinic," with a panel consisting of James S. Stringfellow, Draper Corp., and Nick Nesbitt, Grinnel Corp., Providence, R. I.; chairman—William Hale, Springfield Foundry Co., Indian Orchard, Mass.; co-chairman—William O'Dell, L. F. Fales Machine Co., Walpole, Mass.

Mr. Mooney declared that the cleaning room is always the bottleneck of the foundry. To cut cleaning cost, he advised better molding practice, use of smaller chaplets or elimination of chaplets where possible, use of sand control, back-charging cleaning costs to the department at fault in running up costs, and use of a bonus plan. Benefits of improvement in the cleaning room are reflected throughout the foundry, he declared.

Mr. Jaeschke discussed fundamentals of cupola operation at considerable length. He described design and construction of a cupola and outlined Belden's classic experiments on combustion conditions.

The three non-ferrous sessions featured:

"Plaster Molding," Robert Megaw, U. S. Gypsum Co., Chicago; chairman—Julius Ferrari, Gorham Mfg. Co., Providence, R. I.; co-chairman—Walter Carlson, Carlson Pattern Works, Springfield, Mass.

"Melting Practice," Robert A. Colton, Federated Metals Div., American Smelting & Refining Co., Newark, N. J.; chairman—Ralph Tierney, Exeter Brass Div., Bridgeport Brass Co., Exeter, N.H.

"Casting Clinic," with the following panel: Dan Sutherlan, Somerville Machine & Foundry Co., Somerville, Mass.; Eli Portman, Stillman-White Foundry, Providence, R.I.; Kneeland McIlvin, Bethlehem Shipbuilding Corp., Quincy, Mass.; Fran Wolfer, American Hardware Co., New Britain, Conn.; Robert Sheldon, Springfield Bronze & Aluminum Co., Springfield, Mass., and Frank Tibbetts, Wollaston Brass & Aluminum Foundry, Wollaston, Mass. Messrs. Tibbetts and McIlvin were chairman and co-chairman, respectively.

Mr. Megaw described the use of gypsum plaster for production of molds. Plaster, he said, is part of the answer to the foundryman's search for a casting requiring minimum finishing. Plaster alone is not sufficiently refractory and should have added to it materials like talc, silica flour, and asbestos to resist pouring temperatures of the copper-base alloys. Temperatures of the ferrous alloys cause plaster to break down and they are not usually cast. He described several plaster molding processes and showed a color-sound movie of plaster casting at Scientific Cast Products Corp.

Megaw pointed out that permeability of conventional plasters (except in a process requiring an autoclave treatment) is less than one. This can be overcome, he said, by using a mixing technique and material that foams the plaster and leaves it with a permeability of 25 or better. He demonstrated the technique and declared that up to 25 per cent sand (increases freezing rate of metal) could be incorporated in the mixture without appreciably lowering the permeability. During the question period it was brought out that lead over 1 per cent in copper-base alloys made metal cast in plaster porous.

Mr. Colton gave the following rules for melting aluminum alloys: 1. Charge clean, dry metal. 2. Melt with a neutral or oxidizing atmosphere. 3. Melt fast and get the metal out of the furnace. Failure to observe these precautions may result in gassy metal due to hydrogen (more soluble the higher the temperature of the molten metal) which will show up as uniformly distributed pinholes. If gas is a problem, degas with nitrogen, chlorine, or degassing pills, he advised. He frowned on cooling overheated metal with solid pieces (let it cool by itself) and warned against stirring which causes entrapment of aluminum oxide.

For copper-base alloys, Colton said, follow the three rules above, but in addition observe good deoxidizing practice. He added rules 4 and 5: skim (not stir) the metal clean, and deoxidize properly with phosphor copper, particularly in the case of tin and leaded-tin bronzes. Detecting gas in copper-base alloys is not as simple as in aluminum alloys and it becomes a problem of distinguishing between gas and intermediate shrinkage. Most bad copper-base castings result from poor gating and risering rather than gassed metal, he stated.

During the non-ferrous casting clinic, Mr. Sutherlan brought out the importance of good furnace maintenance to good melting practice. Mr. Portman advised chilling when a section can't be fed. He uses cast iron chills which are sand blasted, coated with shellac, sprin-

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C. A. Wyatt, Debevoise-Anderson Co.

Group of foundrymen from Chas. G. Allen Co., Barre, Mass., pose for cameraman at New England Regional.

Chicago Chapter Makes First Kennedy Award

Philip S. Webber, University of Illinois, second from the left, the first to receive the Robert E. Kennedy Scholarship Fund Award established by the Chicago Chapter, presented at the November meeting of the chapter. Others, from left to right are, Robert E. Kennedy, Robert L. Doelman, chapter chairman and Dean Fred W. Trezise, U. of I.

Philip S. Webber, now a junior in mechanical engineering at the University of Illinois, Champaign, Ill., was the first recipient of the Robert E. Kennedy Scholarship Fund Award established by the Chicago Chapter of AFS. He was selected on the basis of his outstanding record at the Navy Pier Branch of the university during the past two years. The presentation was made at the November meeting of the chapter.

Among those present at the meeting, which was designated Robert E. Kennedy Scholarship Night, were: Dean of Engineering Fred W. Trezise, who introduced Mr. Webber to the group; Robert E. Kennedy, for whom the scholarship endowment is named; John A. Rassenfoss, American Steel Foundries, who was chapter president last year when the scholarship fund was established, and Robert L. Doelman, chapter president, who presented the check, representing income from the endowment fund, to Mr. Webber.

The award is intended to provide an annual scholarship for a student "selected for this honor on the basis of character, ability, interest in work related to the foundry industry and financial need".

The fund was set up by the Chapter as a tribute and expression of affection to Bob Kennedy, AFS secretary emeritus, and long-time member of the Chapter.

Mr. Kennedy has devoted his life to educational aspects of the foundry industry. In June last year he retired as associate professor in charge of the foundry and pattern laboratory which he helped to set up when the Navy Pier branch of the university was established. He had served AFS in various capacities for 24 years.

The initial $5000 endowment fund was established by the Chicago Chapter with funds withdrawn from its accumulated surplus. The agreement provides that subsequent additions may be made to the fund, and the chapter is encouraging contributions to provide broader scholarship benefits. Only income from the fund is used.

Philadelphia Honors Two At October Meeting

At the October Meeting of the Philadelphia Chapter of the American Foundrymen's Society, which from now on, will be known as William G. Coleman Night, Clyde Jenni, chief metallurgist, General Castings Co., Eddystone, Pa., announced the establishment at Pennsylvania State University of the William B. Coleman Scholarship Award. The award is in recognition of Mr. Coleman's outstanding service to the foundry industry, and is to be made annually to a senior student enrolled in industrial engineering, mechanical engineering or metallurgy.

Scholarship offers an annual award of $500; half to be given to the recipient at the start of his senior year and the balance at the beginning of the second semester. Awards will be based on: past academic achievement as shown by the student's rank in upper two-fifth's of his class; desirable personality and character traits; evidence of leadership; participation in extra-curricular activities; past association with and interest in the foundry industry and financial need.

To be eligible for the award an applicant must be registered as a full time student of Pennsylvania State University in industrial engineering, metallurgy or mechanical engineering. Applications for any academic year must be submitted not later than the preceding March 1.

Mr. Coleman was the first chairman of the Philadelphia Chapter and currently is secretary-treasurer. He has devoted more than 20 years to chapter service. He is president of W. B. Coleman & Co., chemical and metallurgical consultants, Philadelphia.

The Lew Lane memorial presentation was also made at the October meeting of the chapter. Mr. Lane was a member of the chapter who died a few years ago. He was a key man in the operation of the chapter, and gave much of time and effort in work of the chapter. B. A. Miller, past chairman of the chapter and close friend of Lew Lane presented the plaque to Russell Lane, son of Mr. Lane, who accepted the memorial in his father's name.

Picture at left shows Philadelphia Chapter Chairman Daniel Best, left, and William B. Coleman, chapter secretary, looking at presentation made to Mr. Coleman formal'y acknowledging the creation of the William B. Coleman Award Scholarship. Right view, left to right, B. A. Miller, close friend of the late Lew Lane, and Russell Lane accepting memorial plaque in his father's name in recognition of Mr. Lane's many contributions to the success of the Philadelphia Chapter.

F. R. YOUNG, E. A. WILCOX CO.

WASHINGTON . . AFS National President F. J. Dost, standing, speaking at the management luncheon held October 11.

Chapter News

Form Past Presidents Club

Former presidents of the Chicago Chapter of AFS met December 2 at the Illinois Athletic Club to organize a Past Presidents Club. Meeting under the temporary chairmanship of Harold Johnson, Wells Manufacturing Co. were: James Thomson, Continental Foundry & Machine Co.; Leon J. Wise, Chicago Malleable Castings Co.; J. C. Gore, Archer-Daniels-Midland Co.; L. H. Rudesill,

James Thomson

Griffin Wheel Co.; C. V. Nass, Beardsley & Piper Div., Pettibone Mulliken Corp.; and J. H. Owen, Harbison-Walker Refractories Co. Many unable to attend sent messages. National Director Thomson, senior past president residing in the Chicago area, was named first president of the club. Each succeeding year, the next youngest past president in point of service residing in Chicagoland will head the club. Mr. Owen was named club secretary.

Objectives of the Chicago Chapter Past Presidents Club are:

1. To provide a medium for the preservation of valued friendships formed through past association with the Chicago Chapter.

2. To hold itself in readiness to render to the Chicago Chapter such service as may be requested by the officers and directors of the active chapter.

Toledo

The Defiance Plant of Central Foundry Div., G.M.C., was host to the Toledo Chapter in October. The group was divided into 10 units and conducted on a plant tour by 10 of the members of the Toledo Chapter who are also employees of Central Foundry. Among other points of interest the group had an opportunity to see parts of the new expansion program in which the Defiance Plant is engaged. Following the tour a colored movie illustrating some of the new developments in the shell mold process and emphasizing the importance of improved methods in foundry operation was shown.

Tennessee

The Tennessee Chapter held its November meeting at the Hotel Patten, Chattanooga, Tenn. Approximately 63 members and guests heard Walter R. Jaeschke, Whiting Corp., speak on *"Cupola Operation."* Mr. Jaeschke was introduced by Harry Mouat, a member of the Birmingham Chapter. Charles S. Chisolm presided. At the October meeting Tom Barlow, International Mineral & Chemical Corp., spoke on *"High Pressure Molding."* William B. Grieser, program chairman, introduced the speaker.—*W. F. Hetzler.*

Canton

A. S. Coulter, Archer-Daniels-Midland Co., spoke on *"Causes of Casting Scrap Due to Cores"* at the November meeting of the Canton District Chapter, held at the Elks Club, Barberton, Ohio. He had a list of all the known causes of casting scrap due to cores. A list of possible remedies was also included. Each of the items were discussed by the group. A. S. Morgan, Babcock & Wilcox Co., presided and H. A. Biddinger, F. E. Myers & Bro. Co., was technical chairman.—*A. S. Morgan.*

Quad City

Members of the Quad City Chapter toured the technical facilities of the United Township High School under the guidance of C. McCoy and L. Vines of the Vocational Dept. After the tour, W. Ellison, chapter chairman, introduced Hans J. Heine. AFS Technical Director, who spoke on *"The Foundrymans Most Unused Tool."* Mr. Heine pointed out that the future was more than rosy for the foundry industry if quality and control are met. Slide illustrations pointed out what could be done with imagination and design to cut costs and increase properties by casting. Low cost test methods, employing Stress Coat and its advantages in use before going into production were

BILL WALKINS, ELECTRIC STEEL FOUNDRY CO.

PORTLAND . . Panel discusses casting defects at the October meeting. Left to right; Ernst Buck, Hal Story, Herb Tatham, Vince Belusko, Milan Sepich and Bob Burns. Standing is Harry Czyzewski who acted as moderator.

TEXAS . . Left to right, James R. Hewitt, vice-chairman; L. D. Richard, Eutectic Welding Alloys Corp., guest speaker, and Edward W. Wey, chapter chairman, at the September meeting.

E. H. MOSSNER

SAGINAW VALLEY . . Speakers at the November meeting, left to right: T. A. Lawton and H. Weaver, Buick Motor Div., and Technical Chairman C. Tobias.

TWIN CITY . . Panel speakers at the October joint meeting of the AFS-ASM Twin City Chapters are, left to right: L. J. Pedicini, R. W. Heine and F. S. Brewster.

NORTHERN CALIFORNIA . . T. Barlow, Eastern Clay Products Dept., International Minerals & Chemical Corp., is flanked on the left by Reception Committee Chairman Dan Henry, Federated Metals Div., American Smelting and Refining Co., and on the right by Membership Chairman Edwin Berger, Associated Smelting Co., prior to his talk before the Chapter November meeting.

HAROLD WHEELER, SUPERIOR FOUNDRY CO.

NORTHEASTERN OHIO . . Fred Pfarr, left, Lake City Malleable Co., chairman for the F. Ray Fleig Night, held in October, presenting luggage for Mr. Fleig.

introduced. A movie on Automation, sponsored by Albion Malleable Iron Co., followed Mr. Heine's talk.—*Grant F. Thomas.*

Ohio State University

The Ohio State Student Chapter met in the Industrial Engineering Building on the University campus November 2. Guests present were A. Agostini, Grede Foundries, Inc., Milwaukee; Dallas Marsh, Cooper-Bessemer Corp., Mt. Vernon, Ohio, industrial advisor, and Paul Eubanks, Ohio Steel Co., Springfield, Ohio, industrial advisor.

Mr. Marsh outlined the Central Ohio Chapter's newly adopted procedure of having one or more of their members attended each Student Chapter meeting and the advantages of having one or more of the Student Chapter members attend the Central Ohio Chapter's meetings. Mr. Agostini, principal speaker, talked on *"The Relationship of the President and the Sweeper."*

On November 11 a group of the chapter members and guests toured the Ford Motor Company's foundry and engine plant in Cleveland. It was announced that this year 13 Ohio State University students will share in scholarship and awards provided by the Foundry Educational Foundation through the University Development Fund and the Industrial Engineering Dept.

Birmingham

The November meeting of the Birmingham District Chapter was held at the Jefferson Davis Hotel, Anniston, Ala., and was attended by 127 members and guests. The coffee talk was given by Walker Reynolds, Alabama Pipe Co., and his subject was *"Football for 40 Years"*. Following the coffee talk, the meeting broke up into two groups for the purpose of panel discussion. Chairman of the ferrous group was Frank H. Coupland, American Cast Iron Pipe Co. Panel members were: John C. Cranford, American Cast Iron Pipe Co.; Walter Gann, M and H Valve and Fittings Co.; E. C. Finch, American Cast Iron Pipe Co., and George Vann, Newbury Manufacturing Co. Mr. Finch led off with a discussion of synthetic sands for heavy and medium gray iron and steel castings. He was followed by Mr. Vann who discussed sand practice for small gray iron castings. Mr. Cranford and Mr. Gann devoted their time to discussions of resin bonded sands for core making and shell molding. Chairman of the non-ferrous group was Morris Hawkins, Stockham Valve and Fittings Co. Panel members were: Frank Lane, Stockham Valves and Fittings Co.; Robert B. Carr, Lee Brothers Foundry; and A. H. Turner, Dixie Bronze Co., Inc. Subjects which developed special interest were synthetic sands for brass castings and cement bonded molds for non-ferrous work.—*J. A. Wickett.*

Eastern New York

More than 60 members and guests attended the November meeting of the Eastern New York Chapter at Panetta's Restaurant, Menands, N. Y. Guest speaker was Frank G. Steinebach, editor of *Foundry*, and his subject was *"Can We Sell More Castings"*. He reviewed the developments in the industry since 1900. He listed some of the developments made in recent years as nodular or ductile iron, basic cupola, shell molding, D-Process, pressure molding, investment casting and improved equipment for handling, cleaning and ventilating. Production, research, pricing, selling and promotion, were the factors the speaker pointed out for selling more castings.—*L. J. DiNuzzo.*

Wisconsin

Approximately 250 members and guests attended the November meeting of the Wisconsin Chapter at the Schroeder Hotel, Milwaukee. After dinner the meeting was divided into sectional groups. At the malleable session Prof. R. W. Heine, University of Wisconsin, was chairman and C. A. Stegemeyer, Federal Malleable Co., was co-chairman. Guest speaker was Warner Bishop, Archer-Daniels-Midland Co., Cleveland, and his subject was *"Common Sense in Cores"*. Mr. Bishop stated that the observation of proper mixing, material measurement, moisture control and baking were necessary to get lowest core costs. Dave C. Zuege, Sivyer Steel Casting Co., was chairman at the steel session. John Rassenfoss, American Steel Foundries, East Chicago, Ind., was guest speaker and his subject was *"Sand Reclamation"*. Dry sand reclamation methods are not satisfactory where reclaimed sand is to be used like new sand; i.e. where the sand is to be used for high tensile cores as well as for molding, the speaker pointed out. The high clay content of dry method reclaimed sands limits their use to molding, and new sand must be used for cores; in foundries where such a practice can be carried out, great economies can still be realized, he said. At the grey iron session Erick Wussow, Kaukauna Foundry & Machine Co. was chairman and speaker was Lester B. Knight, Lester B. Knight Associates, Chicago. *"Mechanization of the Small Foundry"* was the speakers subject.

"Foundry Sand Control" was the subject of Chester R. Polanski, consultant, at the non-ferrous session. Chairman was Henry Seeboth, sales representative. The entire talk was on the necessity of equal grain distribution and grain fineness.

F. S. Brewster, Harry W. Dietert Co., Detroit, spoke on the *"D Process and Equipment"* at the pattern session. Martin Ehrman, International Harvester Co., Milwaukee, was chairman.—*W. R. Matschulat.*

St. Louis

Michael R. Gallo, Great Lakes Carbon Corp., addressed 75 members and guests of the St. Louis Chapter on the subject of *"Coke and its Relation to Cupola Operations"* at the November meeting. He opened his talk with an evaluation of the factors influencing the efficiency of coke with particular emphasis on the carbon content of the coke. Using slides,

he pointed out some of the most widely accepted features of modern cupola design and he discussed the matter of tuyere ratios with a recommendation that it be held between 1 to 2.5 and 1 to 4.5. Mr. Gallo also showed a film, *"The Magic Stone"*, produced by the Great Lakes Carbon Corp. at its St. Louis Merchant Coke plant. The film carefully followed the process of making foundry coke from beginning to end.—*J. R. Bodine, Jr.*

Rochester

The issue of radiography in the nondestructive testing of castings was explained to members of the Rochester Chapter at the November meeting by Roy G. Tobey, X-Ray Div., Eastman Kodak Co., Rochester, N. Y. He illustrated with slides, an application where a gray iron casting was substituted for a forging. This substitution was made possible from the x-raying of trial castings to determine where defect may occur. Some x-ray equipment has the capacity to penetrate nine in. of steel, he pointed out.—*H. G. Stellwagen.*

Michigan State College

The Michigan State College Student Chapter opened the season with a meeting and smoker at the Student Union. Guest speaker was Fred Hodgson, a recent M.S.C. graduate, now with Eaton Mfg. Co., Vassar, Mich. He spoke about his training and experiences in industry. At the business meeting plans for a membership drive were discussed as well as plans for the Career Carnival.—*Jack M. Goldberg.*

Philadelphia

The November meeting of the Philadelphia Chapter, attended by 156 members and guests, was held at the Engineers Club, Philadelphia. Guests included 18 students and two professors from the Pennsylvania State College, at which school the Philadelphia Chapter has established the Wm. B. Coleman Annual Scholarship Award. George Ansulman, Foundry Consultant, was guest speaker and his subject was *"Taking the Mystery Out of Quality Control"*. To simplify quality control without a lot of figuring and writing can be accomplished by plotting all controls on a chart, he said. Good control starts with the purchase of raw materials. Three steps necessary in all quality control work are: specify, check and reject. By checking is meant a laboratory check into the actual contents of packages or bags. Another important factor is the handling and storage of raw materials. With proper care taken in selection of materials, handling and storage of same, use of the materials, good supervision and workmanship, and good working equipment, there is no reason why we cannot be well on the road to good, sound quality castings, he concluded.—*C. R. Sweeny.*

Chicago

Approximately 250 members and guests attended the December Round Table meeting of the Chicago Chapter held at

ST. LOUIS . . Head table at the November meeting, from left to right, F. O'Hare, O'Hare Foundry Co.; R. E. Hard, St. Louis Coke and Foundry Supply Co.; H. Steinmetz, Liberty Foundry Co.; R. Gallo, Great Lakes Carbon Corp.; F. J. Boeneker, Bronze Alloys Co.; G. L. Mitsch, A.C.F. Industries, Inc.; F. G. Froese, Mexico City; and P. E. Retzloff, Nordberg Mfg. Co.

TOLEDO . . Attending dinner prior to a plant visit of the Central Foundry Div., are left to right, R. C. Van Hellen, Unicast; Thaddeus Giszczak, Central Foundry; Carl A. Keener, Central Foundry; C. E. Eggenschwiler, Bunting Brass and Bronze and Chapter chairman; T. R. Schroeder, and J. B. Malone, both of Central Foundry.

EASTERN CANADA . . Chapter Officers, Directors and Guest Speaker at the October meeting. From left to right: M. McQuiggan, G. F. Norman, W. Tibbits, S. L. Gertsman, speaker; C. Bourassa, chapter chairman; Wm. Dunn, vice-chairman; C. H. Dutton, H. Robb, J. Hunt and P. von Colditz.

UNIVERSITY OF ALABAMA . . Shown at a luncheon for Industrial Advisors, J. O. Klein, Texas Foundries, and L. H. Durdin, Dixie Bronze Co., held in October by the Student Chapter are, left to right, E. C. Wright, S. S. Lathem, J. O. Klein, J. R. Condra, L. H. Durdin, H. D. Bradshaw and G. A. Gorham.

AFS Chapter Chairmen

Claude B. Schneible, president, Claude B. Schneible Co., Detroit, Mich., is chairman of the Detroit Chapter of AFS and a national director of the Society. After attending Northwestern University, Mr. Schneible began his foundry career at Joseph Schneible Co., Chicago, as a draftsman, and was with American Foundry Equipment Co., Mishawaka, Ind., (now American Wheelabrator), before forming his own company in 1935. Prominent in the foundry field, Mr. Schneible is a past chairman of the board of F.E.F. and a past president of F.E.M.A.

Burton L. Bevis, chairman, Central Illinois Chapter of AFS, is supervisor of classroom instruction, Caterpillar Tractor Co., East Peoria, Ill. Mr. Bevis has been employed by Caterpillar since his graduation from their Foundryman Apprentice Course in 1941. Active in AFS, he has served as chairman of the Apprentice Trainee Committee of the Educational Div., and as vice-chairman and program chairman of the Central Illinois Chapter. His talks include *"Foundry Apprentice Course at Caterpillar"* presented at the 1950 Convention of American Foundrymen's Society.

the Chicago Bar Association. W. W. Levi, Lynchburg Foundry Co., was the speaker at the Gray Iron Session and J. Wooddell, Hansell-Elcock Co., acted as chairman. Mr. Levi spoke on *"Basic Cupola Operations"*. He described the complete detail of the basic lined water cooled cupola. He pointed out that it is equipped with five 6 in. diameter copper tuyeres which project beyond the lining of the cupola to achieve deeper blast penetration. The hearth is lined with carbon paste up to the top of the tuyeres. Excellent results have been obtained in producing low sulphur iron, he said.

At the Steel and Malleable Session, Clyde Wyman and Charles Faist, both of Burnside Steel Foundry, were the speakers. The subject was *"Summary Report of AFS Hot Tear Project"*. Chairman was Paul R. Gouwens, Fahralloy Co., and co-chairman was Robert Cech, National Malleable & Steel Castings Co.

Wayne A Wright, Woodruff & Edwards Co., was the speaker at the Pattern and Non-Ferrous Session and his subject was *"Patterns for Shell Molding"*. D. Stockberger, Chicago Pattern Works, was chairman and D. G. Schmidt, H. Kramer & Co., was co-chairman.

At the Maintenance Session, *"Scheduling Preventative Maintenance"* was the subject of the speaker, E. E. Ballard, Lester B. Knight & Associates, Inc., Chicago. E. W. Greenlees, Kensington Steel Co., was chairman for the session.

Missouri School of Mines

On November 17, nine members of the St. Louis Chapter traveled to Rolla, Mo., for a meeting of the Missouri School of Mines Student Chapter. George Mitsche, A.C.F. Industries, vice-chairman of the St. Louis Chapter addressed the students on the subject *"Do Foundries Need Engineers"* and then conducted a forum discussion on the subject with the St. Louis visitors participating. It was generally agreed that there is a good future for young engineers within the foundry industry.—*J. R. Bodine, Jr.*

Metropolitan

Two papers dealing with novel mold and coremaking techniques were presented at the November meeting of the Metropolitan Chapter at the Essex House, Newark, N. J., which was attended by more than 100 members and guests. Speakers were Tom Barlow, Eastern Clay Products Corp., who spoke on *"Pressure Molding,"* and Hans Hinrichs, Federal Foundry Supply Co., whose subject was *"Green Sand Core and Mold Blowing."*

Mr. Barlow discussed the theory, practice and present applications of this technique of founding high quality green sand castings, with emphasis upon the varying degrees of dimensional tolerance and surface finish obtainable through choice of equipment, type and quality. Mr. Hinrich's presentation dealt with the use of core blowing equipment for the production of green sand cores and molds. He discussed a number of techniques used in adapting core blowing

AFS Chapter Chairmen

Edwin E. Pollard, vice-president and general manager, Caldwell Foundry & Machine Co., Birmingham, Ala., is chairman of the Birmingham Chapter of AFS. After receiving a degree in mechanical engineering from Alabama Polytechnic Institute in 1936, Mr. Pollard was employed by the American Cast Iron Pipe Co., Birmingham. Before joining Caldwell, he was plant manager, Alabama Pipe Co., Anniston. He is a member of A.S.M.E. and has been a director of the Birmingham Chapter of the American Foundrymen's Society.

Robert V. Osborne, president of the Wisconsin Chapter of AFS, is vice-president of Lakeside Malleable Castings Co., Racine, Wis. Following graduation from Northwestern University in 1937, he worked as an engineer for Carnegie Illinois Steel Corp., Chicago. In 1941 he joined Lakeside as a plant engineer, and advanced to secretary in 1942 where he remained until 1946 when he became vice-president. He is a member of several technical organizations, including A.S.M., M.F.S., and G.I.F.S. He has been vice-chairman of the Malleable Div. of AFS.

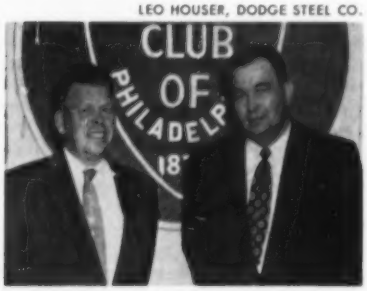
KEN SHECKLER, CALMO ENGINEERING CO.

SOUTHERN CALIFORNIA . . Chapter secretary J. William Mitchell, left, and guest speaker T. E. Barlow, at the November meeting.

CLAUDE B. SCHNEIBLE CO.

DETROIT . . Speaking at the October meeting of the chapter is Wm. M. Maloney, AFS General Manager, center, left, C. B. Schneible, Claude B. Schneible Co., Detroit, chapter chairman, and right, C. W. Hockman, Cadillac Motor Car Div.

LEO HOUSER, DODGE STEEL CO.



PHILADELPHIA . . Henry C. Winte, left, Florence Pipe Foundry and Machine Co., technical chairman for the November meeting and guest speaker George Anselman, Foundry Consultant, right.

WILLIAM ELLISON, THEIM PRODUCTS, INC.

QUAD CITY . . H. J. Heine, left, AFS Technical Director, and L. Vines, Director of Vocational Dept., United Township High School, at the November meeting of the chapter.

equipment for mold blowing, including box design, and location and relationship of core box vents and blow holes for best efficiency.—*Seymour B. Donner.*

Texas

The San Antonio Section of the Texas Chapter held its November meeting at the Alamo Iron Works. A color film, *"Production of Centrifugal Steel Tube,"* was shown. The film was furnished by American Cast Iron Pipe Co., Birmingham, Ala. The regular casting problem clinic was held with two problems being presented and discussed. Refreshments followed the meeting, sponsored by Kincaid-Osbourn Electric Steel Co.—*George H. Hartwell.*

Northeastern Ohio

About 200 members and guests of the Northeastern Ohio Chapter met in November at Tudor Arms Hotel, Cleveland, to hear Walter R. Jaeschke, Whiting Corp., Harvey, Ill., discuss *"Cupola Operation."* David Clark, Jr., Forest City Foundries Co., chapter chairman, presided and Lewis T. Crosby, Sterling Wheelbarrow Co., chapter vice-chairman and program chairman, introduced the speaker.

Mr. Jaeschke opened his remarks on fundamentals of cupola operation by stating that the cupola has increased its popularity and withstood the competition of other types of melting furnaces because of its simple design and operation; low initial and low operating costs; high thermal efficiency; ability to melt on a truly continuous basis; ability to melt large tonnages at high hourly rates, and its adaptability to melting steel scrap. He closed his talk by showing slides and charts of several studies made on combustion within the cupola. Slides were also shown of various pieces of equipment being used in the industry as tools to provide greater control over the variables that enter the cupola melting process.—*Kenneth L. Mountain.*

Chesapeake

Two color films were shown at the November meeting of the Chesapeake Chapter held at the Engineers Club. The films were the American Foundrymens Society's *"Effect of Gating on Casting Quality"* and American Zinc Institute's *"How Else Would You Make It."* The AFS film showed, by use of a transparent mold, the advantage of proper gating and the second film was devoted to the latest developments in die casting. M. J. Kelly, Kelco Corp., presided and technical chairman was J. J. Brenza, Koppers Co.—*Henry M. Witmyer, Jr.*

Southern California

The November meeting of the Southern California Chapter was held at the Rodger Young Auditorium and was attended by 133 members and guests. T. E. Barlow, Eastern Clay Products Dept., guest speaker, spoke on *"High Pressure Molding"*. Edward Haines, chapter educational chairman, presented a number of guests representing various technical and educational institutions. They were

WALTER NAPP, DELTA OIL PRODUCTS CO.

WISCONSIN . . Left, John Rassenfoss, American Steel Foundries, speaker at the Steel Group meeting held in October by the Chapter. Dave Zuege, Sivyers Steel Casting Co., right, chairman for the group.

ROBERT G. KING, OBERDORFER FOUNDRIES, INC.

CENTRAL NEW YORK . . Presenting Past Chairman plaque to J. A. Feola, right, at the November meeting. Left, L. D. Wright and center, D. J. Merwin.

ROCHESTER . . Roy G. Tobey, left, discussing non-destructive testing with Don Webster, program chairman, at the November meeting.

CENTRAL OHIO . . Speaking at the November meeting is W. B. Bishop, Archer-Daniels-Midland Co. and seated, Technical Chairman Tom Kusack, O. S. Kelly Co.

UNIVERSITY OF ILLINOIS . . Left to right, Fred Fuster, John W. Deroche, Prof. K. J. Trigger, National Director, Marlin A. Fladoes, Sivyers Steel Casting Co., Milwaukee, guest speaker and George Haley, student group chairman, at a recent meeting of the student chapter.

NORTHERN CALIFORNIA . . Past presidents of the chapter are shown with AFS National President F. J. Dost and W. M. Maloney, AFS General Manager, upon their recent visit to the Bay area. Front row, left to right: John Russo, W. M. Maloney, F. J. Dost, John Bermingham (present chapter president), and Sam Russell. Back row: Fred Mainzer, Ralph Noah, Richard Vosbrinck, A. Ondreyco, George McDonald and Wm. Gibbons.

MICHIGAN STATE COLLEGE . . Attending the first Student Chapter meeting of the season are, left to right, K. Priestley, industrial adviser, R. Morris, R. Friedman, J. Baten and J. Goldberg.

guests of the chapter for the purpose of promoting interest in the foundry industry. Mr. Barlow stated that the pattern, quality of the sand, and equipment, determine to a major degree, the benefit which can be obtained from high pressure molding. The quality of the foundry equipment was also emphasized as being an important essential. Following the talk, a film, *"A career in Metal"*, recently purchased by the chapter, was shown. *—W. G. Stenberg.*

Washington

Instead of holding a regular October meeting, the Washington Chapter took part in the Northwest Regional Conference held at Vancouver, B. C. On the way to Vancouver the chapter sponsored a field trip to the Skagit Steel & Iron Works at Sedro Wooley, Wash. The group visited the foundry, machine shop and new shell plant at Skagit. On October 11 the Chapter held a management luncheon at the Washington Athletic Club which was attended by AFS National President F. J. Dost and AFS General Manager W. M. Maloney. Following the luncheon, several of the members took Mr. Dost and Mr. Maloney on a brief inspection tour of foundries in the area.—*Fred Young.*

Central New York

The November meeting of the Central New York Chapter was held in the Roof Garden, Onondaga Hotel, Syracuse, N. Y. with 96 members attending. Guest speaker was J. Thomas Coggin, Elmira Foundries, Foundry Dept., General Electric Co., Elmira, N. Y. who spoke on *"Practical Application of Statistical Quality Control in the Foundry"*. His talk was illustrated with slides showing actual charts recording the "out of control" causes taken from their own operations. He feels that a quality control program is essential in the foundry, and to be successful, it must be simple; brought up-to-date in the shortest possible lapse of time, and be kept posted where all can see. He recommended AFS publication *"Statistical Quality Control for Foundries"* as a simple guide for necessary procedures. John A. Feola, in recognition of his tenure as Chairman of the chapter for 1953-54, was presented a Past Chairman plaque. Thomas E. Barlow, Eastern Clay Products Dept., International Minerals & Chemicals Corp., spoke on *"High Pressure Molding"* at the October meeting. He discussed recent developments in pressure method of green sand molding with emphasis on patterns, air pressures and flowability of sand. —*Bruce R. Artz.*

Twin City

The October meeting of the Twin City Chapter consisted of the Annual Joint AFS-A.S.M meeting. Feature of the program was a panel discussion of the C, D, and P Processes. Panel moderator was O. Jay Myers, Archer-Daniels-Midland Co., Minneapolis, and panel consisted of L. J. Pedicini, Process Development Section, GMC, Cadillac Div., Detroit, speaking for the C Process; F. S. Brewster, H. W. Dietert Co., Detroit, for the D Process, and R. W. Heinie, As-

FRANK ROBBINS, ROBBINS & BOHR

TENNESSEE . . Seated, left to right, Tom Barlow, guest speaker and W. B. Grieser, program chairman. Standing, Chapter Chairman Charles Chisolm and John Lasater.

sociate Prof., University of Wisconsin, Madison, Wis., for the P Process. By the discussion foundrymen were brought up to date in the latest advances in the C, D, and Pressure Molding Processes, as well as techniques and modifications of the original processes practiced by shops actually using the aforementioned methods in production. Appreciation by the A.S.M. Chapter for the gavel which was presented to them by the AFS chapter, guest at last year's joint meeting, was shown by their formal presentation of a molder's bench-rammer to the Twin City Chapter. Andreas Luksch, Sr., G. H. Tennant Co., Minneapolis, A.S.M. chapter chairman, made the presentation. AFS Chapter Chairman A. W. Johnson, Northern Malleable Iron Co., St. Paul, Minn., accepted on behalf of the AFS Chapter.—*R. J. Mulligan.*

Saginaw Valley

Members on the Saginaw Valley Chapter heard T. A. Lawton and H. Weaver, Buick Motor Div., G.M.C., Flint, Mich., speak on "*Foundry-Machine Shop Relationships*" at the November meeting. Mr. Lawton, representing the machine shop, spoke of "hidden taxes" causing losses. These taxes are: scrap rate, cracked or porous castings, dimensional inaccuracies of locaters, excess stock and variable machineability. Mr. Weaver, speaking for the foundry, called it the creative center of industry. He said that cooperation is the key to good relationship.—*Nicholas Sheptak.*

Oregon

"*High Pressure Molding*" was the subject of Tom Barlow, Eastern Clay Products Dept., International Minerals and Chemical Corp., Chicago, who addressed 80 members of the Oregon Chapter at the Columbia Athletic Club, Portland, Ore., in November. Barlow said that high pressure molding is simply an improved technique of making a better green sand mold—a dense green sand mold made with equipment to achieve high pressure in order to make a good casting of the kind the foundryman wants. The technique is known as Diaphragm Molding and employs a free flowing sheet of rubber which acts as a cushion between the air and the sand, squeezing the sand to uniform density. He stated that mold density is even more important than hardness in producing precision castings. —*Bill Walkins.*

Western Michigan

E. T. Kindt, Kindt-Collins Co., spoke on "*Pattern Engineering*" at the November meeting of the Western Michigan Chapter held at Fingers Restaurant, Grand Rapids, Mich. He pointed out that industrial production has its start in the pattern-shop, and that the pattern-maker is on a high standard of the trades. Mr. Kindt also gave an interesting evaluation of the development of pattern materials and finishes over the past years. Charles C. Cousineau, Carpenter Bros., was recently elected secretary of the Chapter to fill the office vacated by John Powers when he left the Chapter to accept a position in Wisconsin.—*Wilson W. Hicks.*

British Columbia

T. E. Barlow, Eastern Clay Products Dept., International Minerals and Chemical Corp., spoke on "*Pressure Molding*" at the November meeting of the British Columbia Chapter. Most of the members had merely read about pressure molding and therefore asked Mr. Barlow many questions pertaining to the process. It was concluded that pressure molding in its present stage would not find application in the foundries in the area mainly owing to the installation costs involved. —*J. T. Hornby.*

Tri-State

J. G. Winget, Reda Pump Co., spoke on "*Reverbatory Furnace Practice*" at the November meeting of the Tri-State Chapter, held at Coffeyville, Kan. He discussed such critical elements of furnace construction as location of flame impingement and the size and placement of baffles. He gave in detail the melting practice of the 500 and 1000 lb reverbatory furnaces. A high point in his

BIRMINGHAM DISTRICT . . At the November meeting left to right, G. F. Vann, panel member; W. Reynolds, coffee speaker, and E. C. Pollard, chapter chairman.

CINCINNATI . . University of Cincinnati students receiving certificates of scholarship from the F.E.F. are top row, left to right: W. D. Martin, D. M. Kohler, T. D. Cooper, J. M. Mann, F. P. Fazzari, J. T. Gavin and J. D. Sheley, program chairman. Seated left to right: W. H. Hoblitzell, F. E. Westerman, U. C. Professors, F. H. Tompkins, chairman, F.E.F; R. A. Van Wye, U. C. Professor and H. F. Greek, chapter chairman.

WESTERN MICHIGAN . . Left, Dinner speaker George W. Cannon, Sr., past president, Campbell Wyant & Cannon Foundry Co. and featured speaker Thomas E. Eagen, Cooper-Bessemer Corp., at the October Meeting.

talk was the almost continuous pouring cycle obtained in using these furnaces.—*A. M. Fisher.*

Central Ohio

Warner B. Bishop, Archer-Daniels-Midland Co., was the guest speaker at the November meeting of the Central Ohio Chapter. His subject was *"Common Sense in Cores."* Core practice and materials still vary widely throughout the United States, he said. It is fair to say that usable cores can be made from almost anything. They are so made. However, it is also fair to say that, regardless of materials, observance of controlled care and caution will reduce costs concretely, he pointed out. Ninety per cent of the tonnage of cores in the United States today is made of sand, cereal, water and core oil. Other additives are used to provide hot strength, flowability, collapsibility, etc., but the basic American core mix usually contains the above four items, he said.—*Eldon Boner.*

Northern California

The 12th Annual Outing and Golf Tournament was held by the Northern California Chapter in October at the Sequoyah Country Club, Oakland, Cal. Dave Sutch, Brumley, Donaldson and Co., Oakland, was entertainment chairman. Golf winners were Frank Roberts, A. Boschcci and Gene Boscacci. Blind bogie winners were: Gordon Martin, Don Fagan and Dave Sutch. Guest, low gross winner, was Jack Davis. A field of 69 golfers vied for the prizes.—*Jack Campbell.*

Other Organizations

Reading Foundrymen's Association

Michael Bock II, Conneaut, Ohio, discussed the use of insulating materials in ferrous and non-ferrous casting at the November meeting of the Reading Foundrymen's Association at the Berkshire Hotel. Mr. Bock illustrated his talk with color slides and later gave a demonstration of the use of thermic materials. David Tamor, program chairman, introduced the speaker. James Woodward, president, conducted the meeting attended by more than 100 members and guests.—*W. I. Cassidy.*

Chapter Meetings

January

3 . . Chicago
Chicago Bar Association, Chicago. W. G. Ferrell, general manager, Auto Specialties Mfg. Co., St. Joseph, Mich., *"Properly Engineered Castings Will Save Your Customers Money."*

3 . . Central Indiana
Athenaeum, Indianapolis. Professor Schneidewind, University of Michigan, *"Gray, Nodular and Malleable Iron."*

4 . . Rochester
Hotel Seneca, Rochester. Guy A. Pealer, General Electric Co., Elmira, N. Y., *"Pattern Engineering and Coordination of Methods to Produce Better Castings."*

5 . . Central Ohio
Seneca Hotel, Columbus. S. C. Massari, Hansell-Elcock Co., *"Recent Developments in the Foundry Industry."*

10 . . Michiana
Oliver Hotel, South Bend, Ind. National Officers' Nite. Ferrous Division: Sam S. Carter, American Cast Iron Pipe Co., Birmingham, Ala., *"Some Factors in Cupola Control."* Non-Ferrous Division: D. L. LaValle, Federated Metal Division. American Smelting & Refining Co., *"Making Better Aluminum Castings."*

10 . . Timberline
Oxford Hotel, Denver, Colo. C. C. Drake, manager, Griffin Wheel Co., *"Centrifugal Casting of Cast Iron."*

10 . . Western Michigan
Cottage Inn, Muskegon, Round Table Meeting and Old Timers' Get-together. A. W. Demmler, Campbell, Wyant & Cannon Foundry Co.; A. E. Jacobson, Jr., Grand Haven Brass Foundry; C. Locke, West Michigan Steel Foundry Co.; E. T. Price, Cadillac Malleable Iron Company.

10 . . Metropolitan
Essex House Hotel, Newark, N. J. Prof. Howard Taylor, Mass. Institute of Technology, *"Insulating and Exothermic Sleeves for Risers."*

11 . . Northern Illinois-Southern Wisconsin
Lafayette Hotel, Rockford, Ill. C. V. Nass, vice-president and general manager, Beardsley & Piper, Chicago. *"Mechanization in the Core Room."*

11 . . Twin City
Covered Wagon, Minneapolis. Elmer C. Zirzow, director of foundry service, Werner G. Smith, Inc., Cleveland, *"Core Blowing."*

13 . . Northeastern Ohio
Tudor Arms Hotel, Cleveland. Hans J. Heine, American Foundrymen's Society, *"AFS Research, Your Foundry's Silent Partner."*

14 . . Philadelphia
Engineers Club, Philadelphia. Joseph Gitson, Delta Oil Products Co., Milwaukee, *"Sand Additives."*

14 . . Tri-State
Alvin Hotel, Tulsa. J. S. Schumacher, chief engineer, Hill & Griffith Co., *"Foundry Sands."*

14 . . Birmingham
Tutwiler Hotel, Birmingham, Ala. George K. Dreher, secretary, Steel Founders' Society of America, *"Casting vs. Weldments."* Lucius Brannon, Birmingham district office of Social Security, *"Social Security."*

14 . . Eastern Canada
Top Management Night. H. G. Robertson, manager, American Steel Foundries; W. W. Maloney, general manager, American Foundrymen's Society.

17 . . Quad City
Rex Jennings, superintendent, John Deere Waterloo Tractor Works, *"The Foundrys' Responsibility in Automation."*

18 . . Eastern New York
Panetta's Restaurant, Albany. Hans J. Heine, technical director, American Foundrymen's Society, *"The Foundryman's Most Unused Tool."*

19 . . Oregon
Columbia Athletic Club, Portland. Donald J. Reese, International Nickel Co., *"The Melting Department of an Iron Foundry."*

19 . . Central Michigan
Hart Hotel, Battle Creek, Mich. Youth encouragement meeting. E. J. Walsh, executive vice-president, Foundry Educational Foundation, *"Youth Encouragement."* Motion picture, Michigan State College football.

20 . . Washington
Seattle. Donald J. Reese, International

CHESAPEAKE . . Group at the entrance of the administration building, Sparrows Point Plant of the Bethlehem Steel Co. prior to plant visitation made in September.

SAGINAW VALLEY . . Chairman W. W. Holden, left, presenting Membership Award to O. "Tic" Requadt, Dow Chemical Co., Chairman of the Membership Committee 1953-54 which exceeded its quota for the year.

Nickel Co., *"The Melting Department of an Iron Foundry."*

21 . . Texas

White Plaza Hotel, Dallas, Texas. Donald L. La Velle, Federated Metals Division, *"Gas and Its Control in Aluminum Alloy Castings."*

21 . . Tennessee

Hotel Patten, Chattanooga. Lester B. Knight, Lester B. Knight & Associates, *"Modernization of Foundries."*

22 . . Chesapeake

Alcazar, Baltimore, Md. Annual Oyster Roast.

28 . . Chesapeake

Engineers Club, Baltimore, Md. A. S. Coulter, Archer-Daniels-Midland Co., Buffalo, *"Causes of Casting Scrap Due to Cores."*

28 . . Ontario

Royal Connaught Hotel, Hamilton, J. M. Hughes, Stevenson-Kellogg, *"Method-Time-Measurement in the Foundry."*

February

7 . . Western Michigan

Bill Stern's, Muskegon. Frank Rote, Albion Malleable Iron Co., *"Stack Molding."*

7 . . Chicago

Chicago Bar Association, Chicago. National Director Night. Gray Iron & Malleable Div.: John Van Haver, Sealed Power Corp., *"Necessary Controls for Light Section Quality Castings."* Steel Div.: Frank Satek, Continental Fdry. & Mach. Co., *"Casting Improvement by Modern Inspection."* Non-Ferrous & Pattern Div.: Harry St. John. Crane Co., *"Melting of Brass and Bronze."* Maintenance Div.: W. Wroblewski Crane Co., *"Operation and Maintenance of Pneumatic Sand Handling Equipment."*

8 . . Twin City

Covered Wagon, Minneapolis. D. L. Lavelle, American Smelting & Refining Co., South Plainfield, N. J., *"Aluminum Casting Defects and Their Correction."*

8 . . Northern Illinois-Southern Wisconsin

Hotel Faust, Rockford, Ill. Lester B. Knight, president, Lester B. Knight & Associates, *"Modernization of Foundries."*

10 . . Northeastern Ohio

Tudor Arms Hotel, Cleveland. Pattern Makers Night.

11 . . Eastern Canada

"The pH Control in Molding Sand."

14 . . Michiana

Oliver Hotel, South Bend, Ind. Non-Ferrous Div.: H. M. St. John, Crane Co., Chicago. *"Brass and Bronze Foundry Practice."* Ferrous Div.: T. E. Barlow, International Minerals & Chemical Corp., Chicago, *"High Pressure Molding."*

14 . . Timberline

Oxford Hotel, Denver. J. D. Robinson, assistant factory manager, Bendix Prod. Div., Bendix Aviation Co., *"Non-Ferrous Casting Techniques."*

18 . . Tri-State

Tulsa. *"Non-Ferrous Foundry Practices."*

21 . . Quad City

J. S. Schumacher, Hill & Griffith Co., *"Fool-Proof Sand."*

25 . . Chesapeake

Engineers Club, Baltimore, Md. G. A. Pealer, Pattern Department, General Electric Co., Elmira, N. Y., *"Modern Pattern Practice and New Materials in the Foundry."*

25 . . Ontario

Royal York Hotel, Toronto. Past Chairmen's Night. R. Kijowski, Massey-Harris-Ferguson Ltd.; J. McConachie, William Kennedy & Sons; J. Morgan, Foundry Services (Canada) Ltd.; H. Graham, William Kennedy & Sons; T. Hewitt, Canadian Westinghouse Co. Ltd., *"Irish Stew."*

Employee Training Booklet

National Safety Council is offering a new employee training booklet, "What's in It For Me?" The booklet explains that everyone—the employer, the public, and the worker—gains from a good safety program. Stressing the theme that no one is immune to accidents if he is not careful, the booklet emphasizes the fact that it is not where you work but how you work that makes for safety.

"What's in It For Me?" encourages the worker to help himself to happier, accident-free living by aiding the company in its fight against accidents. By reporting unsafe conditions and unsafe acts, the worker can help find a better and safer way of doing the job.

Illustrated in four colors, the booklet uses few words, but plenty of cartoons, to put across its message. For a sample copy and quantity prices, write National Safety Council, 425 N. Michigan Ave., Chicago 11, Ill.

Free Tear Sheets

of all AMERICAN FOUNDRYMAN articles are available on request. Keep your magazine intact and pass it on for others to use. For free tear sheets, write to Editor, AMERICAN FOUNDRYMAN, Golf & Wolf Roads, Des Plaines, Ill. Please show company connection and your title on tear sheet request.

N. E. Regional

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kled with core sand, baked, and stored in a warm place. Mr. McIlvin discussed making large castings in dry sand while Mr. Wolfer covered small, high-production castings to be polished or plated. Change from hand to machine molding with improved patterns to improve casting quality and increase production, he said.

Mr. Sheldon said quality control is largely a matter of common sense. Establish procedures, then follow them, he urged. Mr. Tibbetts said nickel and high nickel-copper alloys belong in the steel foundry because of their high melting and pouring temperatures, although a non-ferrous foundry should have no trouble with gating and risering. These alloys are readily gassed, he said, and must be degassed. He had had success with gas reduction by means of a carbon boil, he concluded.

Dinner Closed Conference

The conference closed with a dinner planned by local representatives of foundry supply companies.

In addition to Messrs. Stazinski, Stenberg, Erkkinen, and Chappell, the following served on the conference committee: Clyde Armstrong, Warren Foundry & Pipe Corp., Everett, Mass.; John S. Barros, And-Bar Non-Ferrous Foundry, Taunton, Mass.; Alexander Beck, Whitman Foundry, Inc., Whitman, Mass.; Thomas I. Curtin, Jr., Waltham Foundry Co., Waltham, Mass.; Frederic B. Duncan, William Duncan Co., East Boston, Mass.; Henry M. Frechette, Fitchburg Foundry, Inc., Fitchburg, Mass.; Ernest S. Frens, General Electric Co., Everett, Mass.; Charles W. Hutchins, Standard Foundry Co., Worcester, Mass.; Herbert H. Klein, Klein-Farris Co., Inc., Boston; Bernard J. Klim, chairman, AFS-MIT Student Chapter; and Clyde Lake, Hyde Windlass Co., Bath, Me.

Other Committee Members

Others on the committee were: Lawrence Litalien, Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.; William Naughton, Whitehead Brothers Co., Providence, R.I.; Albert M. Nutter, E. L. Lebaron Foundry Co., Brockton, Mass.; Howard B. Nye, Crompton & Knowles Loom works, Worcester, Mass.; John H. Orrok, Debevoise-Anderson Co., Inc., Boston; Louis G. Tarantino, Niagara Falls Smelting & Refining Co., Buffalo, N.Y.; Prof. Howard F. Taylor, MIT; and Alexander S. Wright, Springfield Facing, Inc., Willimansett, Mass.

Registration and Reception Committee activities were headed by C. A. Wyatt, Debevoise-Anderson Co., Inc., Boston, chairman, and Herbert H. Klein, treasurer. Publicity was handled by F. S. Holway, Mystic Iron Works, Boston.

Fischer Casting Co. Celebrates 50th Anniversary

Moving into its second half-century of non-ferrous foundry operation, Fischer Casting Co., Inc. celebrated the opening of its new plant in Middlesex, N. J. An Open House, held to mark the event, was attended by over 1000 employes and members of their families. A series of tours were conducted showing the various processes by which a casting is developed from blueprint to jet bomber part. All machinery was labeled with price tags indicating the company's capital investment in plant and equipment. Youngsters were treated to pony rides and everyone lunched under a "big-top" tent.

The growth of Fischer Casting since its founding by Christian J. G. Fischer in 1903, is representative of the industry as a whole. The original plant was located in Hoboken, N. J. and some of its employes were recruited right off the boat; some to stay for 20 or 30 years.

The company was relocated in 1922 in Bound Brook, N. J. after the Hoboken plant burned to the ground. A shift to North Plainfield, N. J. was made in 1933. Necessitated by the demands of World War II, a program of alteration and expansion was begun and the plant tripled in size.

The new, completely modernized, 40,000 ft foundry in Middlesex illustrates the technological advancement made by the industry in the last 50 years. Mechanization has gone forward with the installation of belt and roller conveyors, mechanical sand-handling equipment, dielectric oven, latest type bench and rock-over machines, and complete aluminum heat-treating facilities. Acknowledging the progress of metallurgical science, a well-staffed laboratory maintains quality control.

A plant tour inspects the bronze melting department and overhead exhaust fans at Fischer Casting Company's Open House.

John Bell Travelling Scholarship Established

At a meeting in the Royal Technical College, Glasgow, Sir Andrew McConce, on behalf of the Governors of the College, received from John Bell, president of the Institute of British Foundrymen, a check to establish the John Bell Travelling Scholarship. It was decided to establish the award as a mark of appreciation of the work done by Mr. Bell during 31 years in the office of Honorary Secretary of the Scottish Branch of the Institute. Pictured above at the presentation were, back row, left to right: Daniel Brown, president of the Scottish branch; Dr. Anderson, Director, Royal Technical College; Dr. Hay, Professor of Metallurgy; R. R. Taylor, Governor of the Scottish Conference Executive; A. Marshall, Honorary Conference Secretary and Honorary Secretary of the Scottish Branch; G. M. Menzies, North British Steel Foundry, Ltd., and G. H. Thorsen, Secretary-Treasurer, Royal Technical College. Front row: A. Turnbull, Deputy Chairman, of Governors, Royal Technical College; Sir Andrew McConce, Chairman of the Governors, Royal Technical College; John Bell, I.B.F. President, and Henry Gardner, Glenfield and Kennedy, Ltd.

Engineering and Management Course Scheduled at U.C.L.A.

A two-week Engineering and Management Course for executives, supervisors, engineers, industrial analysts, cost accountants, and other line and staff personnel is scheduled by the University of California, Los Angeles, from January 31 to February 11, 1955.

Classes will be taught by members of the University staff augmented by 15 key men from industry.

The $300 fee includes the cost of texts and course mate-ials, 10 luncheons and three dinners. Additional information may be obtained by writing Edward P. Coleman, coordinator, Engineering and Management Course, College of Engineering, University of California, Los Angeles 24, Cal.

The Seventh Annual Industrial Engineering Institute meeting is being held at the University of California, Los Angeles, January 28 and 29, 1955 and then at the University of California, Berkeley, January 31 and February 1, 1955. The program, which is essentially the same in both locations, features fundamentals and new techniques of industrial engineering and management and recent practical applications of the fundamentals and new techniques to traditional and new areas.

Sand Handling System Installed

Automatic overhead sand handling system recently installed at Superior Brass Works, Inc. Detroit, for its bronze foundry at a cost of $29,000. Unique feature of the installation is that the mechanized facilities are for only six molders. Savings from the installation come from reduction of direct and indirect labor costs, greater productive capacity of the foundry, and less machining stock required on castings.

Whiting Corp. Honors Nielsen

In appreciation of his 35 years service, E. H. Nielsen, right, was honored, on his retirement from Whiting Corp., Harvey, Ill., recently. S. H. Hammond, left, Chairman of the Board of Whiting, presented him with a handsome testimonial scroll. Although retired, Mr. Nielsen will continue to be available for special assignment and is already scheduled for a business trip abroad next year.

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of all AMERICAN FOUNDRYMAN articles are available on request. Keep your magazine intact and pass it on for others to use. For free tear sheets, write to Editor, AMERICAN FOUNDRYMAN, Golf & Wolf Roads, Des Plaines, Ill. Please show company connection and your title on tear sheet request.

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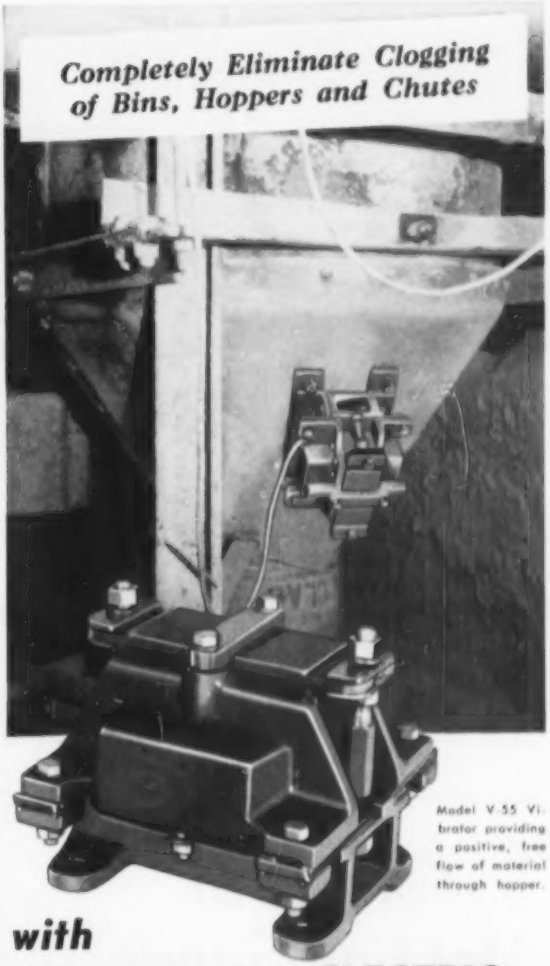

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For more facts, circle No. 870 p. 17-18

EIMCO Corp., with headquarters in Salt Lake City, Utah, has opened a research and development center—first of its kind devoted exclusively to liquid-solids separation through filtration—at 301 South Hicks Road, Palatine, Ill., northwest of Chicago. Also housed in the new structure are EIMCO's central sales division and engineering offices. In addition to every known type of filtration equipment, the building contains facilities for developing new equipment, for testing samples, and for pilot plant set-ups. For the foundry industry, EIMCO will carry on work in sand scrubbing and classification, and water clarification for sand reclamation and wet dust disposal units.

Indonesian exchange students B. Djam, left, and P. Njunggirad, right, being shown a pattern and castings made from it by George W. Cozens, U. S. Electrical Motors. Photo taken by W. G. Stenberg, U. S. Electrical Motors, Inc.

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Malleable Founders' Society Board of Directors met at the Central Foundry Div., General Motors Corp., Saginaw, Mich., recently as guests of J. H. Smith, general manager of the division. Group shown on right, standing from left to right are: James H. Lansing, M.F.S. Technical & Research Director; C. Speitel, Pennsylvania Malleable Iron Corp.; W. H. Moriarty, National Malleable & Steel Casting Co.; L. D. Ryan, M.F.S. Managing Director & Secretary; G. T. Bell, Northern Malleable Iron Co.; J. H. Smith, Central Foundry Div.; C. L. Liebau, Federal Malleable Co., M.F.S. vice-president. Seated, left to right: L. J. Wise, Chicago Malleable Casting Co.; P. C. DeBruyne, Moline Malleable Iron Co.; C. E. Brust, Eastern Malleable Iron Co., M.F.S. president; C. M. Brennan, Jr., New Haven Malleable Iron Co.; and R. L. Gilmore, Superior Steel & Malleable Casting Co.

Attending the Foundry Educational Foundation Advisory Committee meeting at Michigan State College in November are, standing, left to right: K. Spray, Central Foundry Div., G.M.C.; R. Dobbins, Albion Malleable Iron Co.; Dr. R. Thompson, G.M.C. Research Laboratory, Detroit; J. McDonald, Saginaw Malleable Iron Plant, G.M.C.; P. Olson, Eaton Manufacturing Co.; K. Priestley, Vasser Electroley, Inc.; R. Dodge, Archer-Daniels-Midland Co., Detroit; D. Triponi, M.S.C.; F. Hodgson, Eaton Manufacturing Co. Seated, left to right: H. C. Esgar, F.E.F.; D. Boyd, Engineering Castings, Inc.; J. Smith, Chevrolet Grey Iron Foundry, G.M.C.; C. C. Sigerfoos, M.S.C.; F. Flory, M.S.C., and W. Farrell, Auto Specialties Co.

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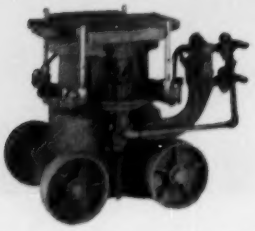

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Abstracts

Abstracts below have been prepared by Research Information Service of The John Crerar Library, 86 East Randolph Street, Chicago 1, Ill. For photoduplication of any of the complete articles briefed below, write to Photoduplication Service at the above address, identifying articles fully, and enclosing check for prepayment. Each article of seven pages or fraction thereof is $1.40, including postage. Articles over seven pages are an additional $1.40 for each seven pages. A substantial saving is offered by purchase of coupons in advance. For a brochure describing Crerar's library research service, write to Research Information Service.

A521 . . "Gray Iron Shell Mold Castings," Kenneth Rose, *Materials & Methods*, vol. 40, no. 2, Aug. 1954, pp. 102-104. International Harvester expects 10 per cent of all gray iron castings to be made in shell molds on the basis of their success with this process in producing stronger castings with better surface and dimensional accuracy. Although more costly in the foundry, there is an overall saving when supplemental operations are considered. It has been found practical to produce castings that are at least twice the weight of the shell mold, provided backing is used.

A522 . . "Air Conditioned Rest Areas Boost Worker Productivity," L. A. Brouha, M.D., *Iron Age*, vol. 174, no. 8, Aug. 19, 1954, pp. 125-127. Higher production, less absenteeism, and lower rate of employee turnover were the results of providing air conditioned rest areas or "recovery rooms" for workers on hot and humid jobs.

A523 . . "Stress vs. Strain in Hot Tearing," John B. Caine, *Foundry*, vol. 82, no. 8, Aug. 1954, pp. 76-79, 233-8. The stress concept of hot tearing is incompatible with evidence of certain observed conditions. A strain concept is proposed with data indicating sand conditions, almost entirely, account for hot tearing.

A524 . . "Safety Works, If You Work at It," H. A. Forsberg, *Foundry*, vol. 82, no. 8, Aug. 1954, pp. 80-83, 192-4. The program that enabled the firm's three foundries to obtain an accident frequency rate of less than 10.

A525 . . "Founding of Marine Propellers," John M. Langham, *Foundry Trade Journal*, vol. 97, no. 1986, Sept. 23, 1954, pp. 343-348. A review of current methods of manufacturing marine propellers with particular emphasis on the sand-cement molding process. Described in detail are the operations of what is probably the largest foundry in the world exclusively casting marine bronze propellers.

A526 . . "New Die Casting Plant Features Melting, Handling Economies," G. B. Nyselius, *Iron Age*, vol. 174, no. 10, Sept. 2, 1954, pp. 108-111. Man-handling of melt and remelt at a minimum: pig into induction furnaces, castings from die to conveyor, remelt from cleaning department back onto conveyor that automatically charges the furnaces. Diagram and pictures show gravity chutes for molten zinc, ladle-adapted fork trucks for distributing aluminum, and other plant features.

A527 . . "How Much Can We Save On Machining?" *Precision Metal Molding*, vol. 12, no. 10, Oct. 1954, pp. 40-41. Even if tooling costs for a precision casting are as much as for some other means of fabrication, the foundry would have the advantage of lower labor costs.

A528 . . "Cut Cupola Charge Costs With Fine Metal Scrap," W. M. Halliday, *Iron Age*, vol. 174, no. 9, Aug. 26, 1954, pp. 106-108. The economies and metallurgical advantages of melting fines are made possible with sheet metal containers which protect the fines from the blast, allow for their expansion, and carry them to the proper zone for melting.

A529 . . "How to Design an Exhaust System," W. W. Dodge, AMERICAN FOUNDRYMAN, vol. 26, no. 2, Aug. 1954, pp. 50-55. The author gives every step of the procedure for using the AFS Dust Control and Ventilation nomograph to calculate a typical cleaning room exhaust system.

A530 . . "Your Foundry Safety Program," *Canada's Foundry Journal*, vol. 27, no. 9, Sept. 1954, pp. 5-7. From

continued on page 96

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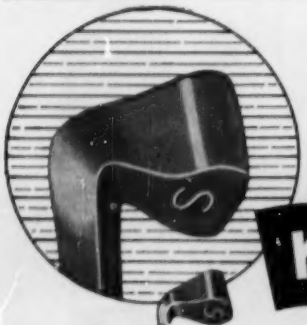

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Obituaries

Clifford L. Wheeler, plant manager of the Aircraft Engine Div., Magnesium Foundry, Ford Motor Co., Chicago, died September 15.

C. Marshall Saeger, Jr., 60 died October 27 of a heart attack at his home in Bethesda, Md. He retired in 1945 as chief of the Experimental Foundries Section of the Metallurgy Div., Bureau of Standards.

Dr. Richard H. Patch, vice-president in charge of operations, E. F. Houghton & Co., Philadelphia, died in Hot Springs, Ark. on November 13.

Arthur J. Harlan, resident manager in Cleveland for Hickman, Williams & Co., died in Cleveland recently. Mr. Harlan was a director of the Northeastern Ohio Chapter of AFS.

Hubert L. Spence, assistant chief engineer, National Malleable & Steel Casting Co., Cleveland, died recently.

William M. Reilley, president, Reilley Bros. Foundry, Harmony, Pa., died recently at the age of 60.

N. E. Regional

continued from page 77

Chapter Chairman Phillip J. Laugen, Oregon Steel Foundry Co., Portland, Ore., extended the best wishes of his chapter and invited all to come to Portland in 1956 for the sixth annual Northwest Regional Conference. Dinner speaker was Dr. James G. Parr, University of B. C. He described the development of metals in a talk entitled *"Blood and Sand."* Dean H. Goard, Vancouver Vocational School, was toastmaster.

Charles C. Smith, Canada Metal Co., Ltd., and Mrs. Smith were in charge of the ladies activities.

Besides those mentioned, the following from Vancouver firms were chairmen of conference committees: Gerald S. Bentley, Western Magnesium Ltd.—Registration; Frank E. Godwin, Overseas Commodities—Transportation; Paul H. Hookings—Housing; Norman Amundsen, Terminal City Iron Works, Ltd.—reception; and James McCulloch, Canadian Sumner Iron Works, Ltd.—luncheon and dinners. Co-chairmen of entertainment were John F. Fulton, Maple Leaf Pattern Works, Ltd., and William J. Turkington, McLean & Powell Iron Works; of publicity were James T. Hornby, and Norman E. Hall, Electric Steel Foundry Co., Portland, Ore.

Others contributing to committee work were: Herbert Heaton, Letson & Burpee, Ltd.; Prof. Armstrong; Mr. Cowden; James A. Dickson, Dickson Foundry Co.; Howard H. Havies, Vivian Diesels & Mutions, Ltd.; Norman Terry, Canadian Sumner Iron Works; and John Minot, S. P. & F. Foundry—all of Vancouver.

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Abstracts

continued from page 94

the writings of W. N. Davis, director of the AFS Safety, Hygiene, and Air Pollution Program. He warns of the danger of placing this program in the hands of an overburdened person to handle as another chore. After suggesting that each operation be considered with safety-opened eyes as though never viewed before, he tells how to develop a safety program for large and small plants.

A531 . . "Development in Foundry Mechanization," R. J. Geitman, *Foundry*, vol. 82, no. 8, Aug. 1954, pp. 70-75, 216, 218, 220, 222, 223. The author discusses the problem of the extent to which an individual foundry can mechanize profitably. Material handling methods are discussed for each foundry department.

A532 . . "Southern Foundry Marks 65 Years of Progress," William G. Gude, *Foundry*, vol. 82, no. 8, Aug. 1954, pp. 90-93, 164, 166. Plant write-up of the Ross-Meehan Foundries, parent organization of the Meehanite Process.

A533 . . "Foundry Completes New Investment Casting Facilities," *Foundry*, vol. 82, no. 8, Aug. 1954, pp. 94-97, 230, 231, 232. Plant write-up of the Milwaukee investment casting operation of Howard Foundry Co., Chicago.

A534 . . "Effect of Melting Frequency on the Properties of Induction-Melted Aluminum Alloys," A. Saia, S. Lipson, H. Rosenthal, *Foundry*, vol. 82, no. 8, Aug. 1954, pp. 84-87, 208, 210. An explanation of the effects of induction melting stirring action on the properties of the cast metal and on the normalcy of the metal structure.

A535 . . "Inspection and Salvage of Magnesium Castings," B. G. Harr, AMERICAN FOUNDRYMAN, vol. 26, no. 2, Aug. 1954, pp. 39-42. Castings removed by "hot," rough casting, or final inspections, properly salvaged by welding, peening, impregnating, or straightening, will have the same quality and serviceability as regular production castings.

A536 . . "Sealing Porous Castings," Wilson N. Pratt, *Tool Engineer*, vol. 33, no. 2, Aug. 1954, pp. 70-72. Advantages of thermosetting polyester resin (styrene copolymer) and procedures used for impregnating light metal castings at the Stratos Div., Fairchild Engine & Airplane Corp.

A537 . . "Indirect Arc Melting," G. C. Behrends, *Canadian Metals*, vol. 17, no. 9, Aug. 1954, pp. 22 and 28. Tips on low installation costs of indirect arc melting equipment found to be most economical and efficient at Western Canada Bronze Co. Ltd.

A538 . . "D Process for Precision Castings." Harry W. Dietert, AMERICAN FOUNDRYMAN, vol. 26, no. 2, Aug. 1954,

pp. 56-65. The author reviews precision processes which he cautions the reader to consider well before investing in any one of them. Discussed in detail are all aspects of the "D" process of producing precision castings from blown and cured shell molds.

A539..."Some Effects of Nitrogen in Cast Iron," J. V. Dawson, L. W. L. Smith, B. B. Bach, AMERICAN FOUNDRYMAN, vol. 26, no. 1, July 1954, pp. 60-64 and vol. 26, no. 2, Aug. 1954, pp. 43-49. Work of the British Cast Iron Research Association on the carbide stabilizing effect of nitrogen in gray iron and malleable, the influence of nitrogen on graphite in gray cast iron, and the neutralizing effect of aluminum on nitrogen treatment.

A540..."pH Control of Foundry Sands," AMERICAN FOUNDRYMAN, vol. 26, no. 3, Sept. 1954, pp. 34-39. A roundtable discussion by seven Milwaukee-area steel foundrymen of their experiences with pH control of molding sands.

A541..."Cupola Bed Practice," Donald E. Matthieu, AMERICAN FOUNDRYMAN, vol. 26, no. 3, Sept. 1954, pp. 40-45. The correct way to prepare the bed for eight methods of lighting-off—part of the recently released, revised and expanded AFS book, THE OPERATION OF THE CUPOLA.

A542..."Carbon Dioxide Process for 'Baking' Molds and Cores," AMERICAN FOUNDRYMAN, vol. 26, no. 3, Sept. 1954, pp. 46-49. A 3½-ton core is hardened in its core box in 15 minutes and used immediately without further treatment. This translation from *Giesserei* describes the hardening of cores and molds bonded with waterglass by exposing them to carbon dioxide.

A543..."Statistical Quality Control for the Foundryman," Ross Martin, Jr., AMERICAN FOUNDRYMAN, vol. 26, no. 3, Sept. 1954, pp. 50-55. Introduction to the fundamentals of statistical quality control shows the foundryman how he can control any variations with assignable causes.

A544..."Revised Spiral Test Relates Fluidity to Phase Diagram," W. A. Spindler, W. B. Pierce, and R. A. Flinn, AMERICAN FOUNDRYMAN, vol. 26, no. 3, Sept. 1954, pp. 56-58. A modification of the spiral fluidity test eliminates pouring variables, is highly reproducible, and indicates fluidity to be dependent upon the amount of superheat above the liquidus of the phase diagram.

A545..."From Price per Pound to Price per Piece," J. L. Carter, AMERICAN FOUNDRYMAN, vol. 26, no. 3, Sept. 1954, pp. 59-60. Advantages of pricing by the piece to both foundry and customer are described.

A546..."Mechanization of Shell Molding," A. Dunlop, *Metal Industry*, vol. 85, no. 9, Aug. 27, 1954, pp. 163-167 and vol. 85, no. 10, Sept. 3, 1954, pp. 192-193. A description of machinery designed to make shells by the dump-box method, assemble shells, and to handle backing material.

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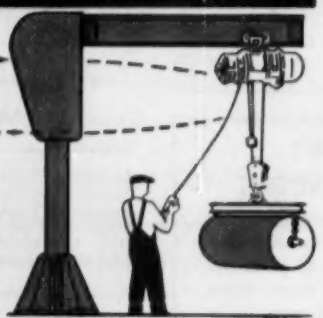
Industrial HEAVY DUTY **JIB CRANES**

Precision engineered and built for smooth efficient operation

360° Rotation



Industrial PBM self-supported Jib Cranes are of all welded steel construction, rotate 360 degrees and have capacities up to 12,000 lbs. The rotating steel head revolves on 4 rollers and 9 precision ball bearings resulting in extremely smooth operation — unsurpassed by any other crane of its type. The high standard of workmanship and material, coupled with reliable performance make Industrial Jib Cranes your best buy.

Industrial manufactures 6 other types of Jibs and many models of Overhead Traveling Cranes to cover every need. Consult with Industrial for cranes to solve your material handling problems.

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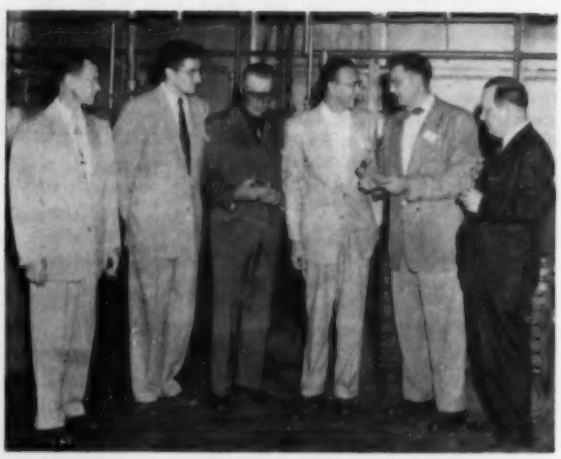
Automotive Dealers Visit Albion Malleable



Albion Malleable Iron Co. guide Jim Snyder (second from right) explains annealing of pearlitic castings to auto dealers at a unique dealer open house designed by the company to acquaint the dealers with the community nature of Michigan's automotive industry. Following the tour of operations, dealers saw the new AMICO color movie "Malleable Metals."

ARCHER QUALITY

LIN-O-CEL

FOUNDRY SAND STABILIZER

Archer LIN-O-CEL is carefully measured by weight, then mixed into system sand.

- *improves flowability*
- *produces better finish*
- *reduces sand costs*
- *cuts cleaning time*

Making an important contribution to both quality and cost reduction is Archer LIN-O-CEL, a foundry sand stabilizer unexcelled in flowability and finish characteristics. LIN-O-CEL is a finely ground cellulose material which "cushions" sand expansion and eliminates stresses at the mold surface. Casting defects are thus minimized.

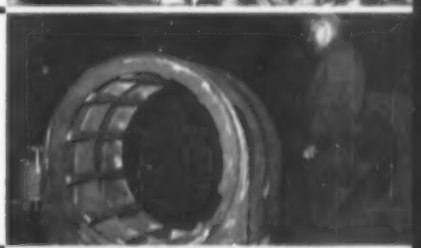
The chart at the right is evidence of the savings which can be gained through the use of LIN-O-CEL.

We urge *you* to be skeptical. First read about LIN-O-CEL; then test a sample in your foundry. Write ADM at address below.

NOTE: The castings pictured are produced by the Foundry Department of the General Electric Company at the Elmira Foundries, Elmira, New York.

SEND FOR BULLETIN NO. 8170 TODAY!

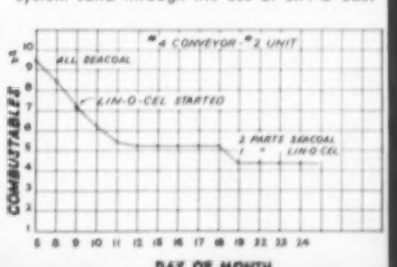
SMALL CASTINGS, such as these fence post caps, are furnished to outside customers by General Electric. Some castings are small as 8 oz.



LARGE CASTINGS, like this huge frame generally require less cleaning when LIN-O-CEL is used.

INTRICATE CASTINGS, for instance this grille made with LIN-O-CEL-treated sand, clean quicker and look better.

SMOOTH FINISH CASTINGS. Unretouched photographs reveal the unblemished surfaces of these bell and frame castings.



SAVING IN SAND COST is revealed by this chart showing reduction in combustibles in system sand through the use of LIN-O-CEL.

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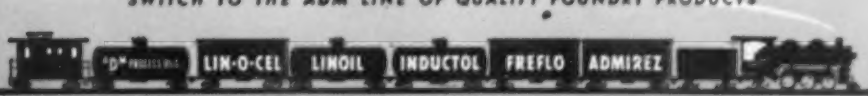
FOUNDRY PRODUCTS DIVISION • 2191 West 110th Street • Cleveland 2, Ohio

SWITCH TO THE ADM LINE OF QUALITY FOUNDRY PRODUCTS



"HOW TO SELECT AN OVERHEAD CRANE"

WHITING

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The information *you* need for planning and selecting the overhead crane that will give the best performance at the lowest cost is contained in a new Whiting booklet . . . Bulletin Unit 79. A helpful, technical bulletin, "How To Select An Overhead Crane" is packed with important data that is of interest to all concerned with heavy materials handling.

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- Standard crane ratings and capacities
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- Recommended speeds
- Motor ratings
- Cage or pendant operation
- How to choose the gear drive
- Structural framework recommendations
- Lubrication of gears and bearings
- 14 minimum safety features
- Erection and initial operation
- Sample form—How to request crane information
- Sample specifications

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